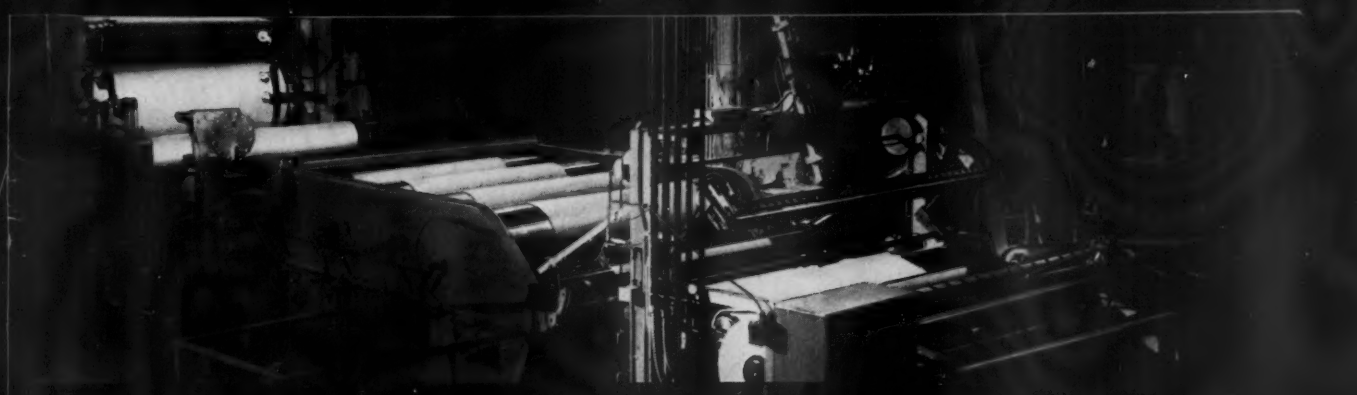
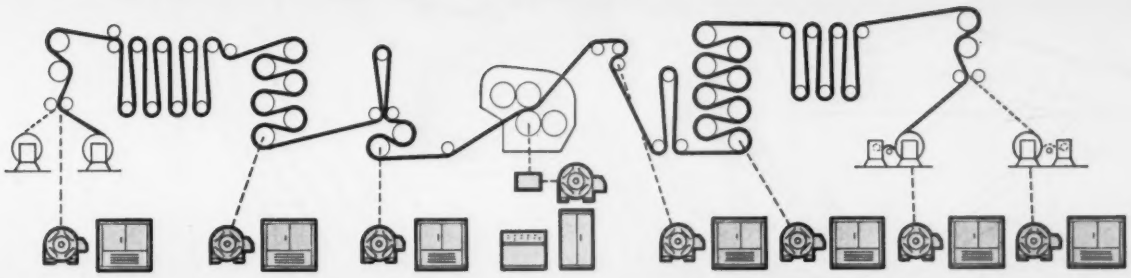
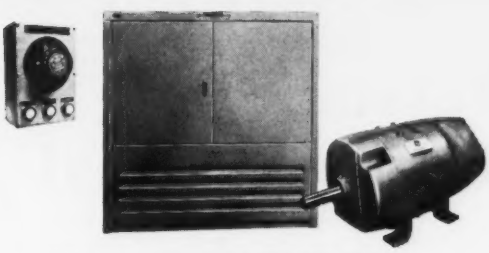


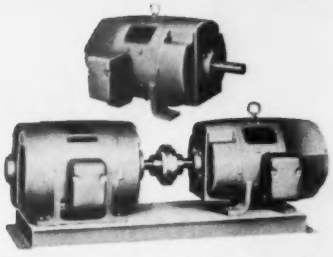
General Electric Calender Drives Speed Production,



Hold Gages and Tensions Accurately, Boost Profits



SPEED VARIATOR PACKAGED DRIVES



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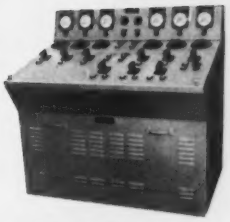

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

MAY, 1959 VOL. 85 NO. 2

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Highlights Sidelights *of the News...*

May, 1959

The contract signed on April 20 by the Goodyear Tire & Rubber Co. and the United Rubber Workers Union, AFL-CIO, is expected to set the pattern for the rubber industry...At this writing, Goodrich, Firestone and U.S. Rubber are closed by company-wide strikes...Wages were not an issue in the Goodyear pact which provides for improvements in working conditions and supplemental unemployment benefits (page 272).

The Canadian Rubber Footwear Information Office reports that domestic and foreign markets are disappearing for Canadian rubber footwear manufacturers...The Office claims that shipments from Japan and from Communist bloc countries are flooding the Canadian market...The Office states that high Canadian wage levels make it almost impossible for the Canadian manufacturer to compete against foreign imports (page 308).

Goodrich-Gulf Chemicals, Inc., has begun operations at new facilities at Port Neches, Texas, designed to produce 15 million pounds of black masterbatch monthly on a continuous flow basis ...The new facilities represent an investment of more than $1-1/4 million (page 274).

Allied Chemical Corp. has completed negotiations with the B. F. Goodrich Co. whereby Allied will acquire the business and assets of Harmon Colors...Harmon will be operated as a separate unit of Allied's National Aniline Division (page 277).

Development of a new liquid urethane elastomer that forms products with extreme hardness in combination with extreme resistance to impact and abrasion has been announced by DuPont ...Designated "LD-213 Urethane Rubber," the new product is compounded chemically (page 279).

Imperial Rubber Manufacturing Co. has acquired a new and larger plant at Hackettstown, N.J., with an annual production capacity of 8 million pounds of tread rubber (page 286).

Leland E. Spencer has been named president of the Goodyear Tire & Rubber Co. of Canada succeeding R. C. Berkinshaw, who has been named chairman of the board of directors (page 308).

for rubber reinforcing pigments, think of Huber

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Free Moisture (Maximum)	5%
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Oil Absorption (cc 100g)	130-140

How NS solved another bead wire problem

NEW PACKAGE inside steel "steam box" completely protected bead wire from rust during six week test.

VACUUM SEALING of new polyethylene bag keeps bead wire safe from corrosive atmospheres. After sealing, cardboard outer wrapper is added for additional protection before palletizing.

NEW NATIONAL-STANDARD PACKAGE PREVENTS BEAD WIRE CORROSION

A new bead wire packaging development from National-Standard permits storage of bead wire indefinitely without danger of rust or corrosion.

Now National-Standard is shipping bead wire in a vacuum-sealed polyethylene bag with a cardboard outer-wrapper to protect against scuffing and tearing. The polyethylene pack was made possible by National-Standard's development of reel-less coil packaging over six years ago.

EXTENSIVE TESTING of the new package over a period of many months has proved the new polyethylene package's superiority over old-style wrappers. National-Standard research engineers placed a new vacuum package, together with an old-style package, in the highly humid environment of a paper mill for several weeks. At the end of the test period, bead wire in the old package showed extensive rust. But wire inside the polyethylene bag was in excellent condition.

For additional proof, National-Standard put the new package through a torture test. For *six weeks*, new vacuum bag (wrapped with cardboard outer package) withstood extremely high humidity inside a steel steam cabinet *without any evidence of wire corrosion.*

NEW PACKAGING TECHNIQUE is a five step process: (1) polyethylene bag is placed over two bead wire coils; (2) a desiccant is placed inside bag; (3) bag is vacuum-sealed; (4) protective cardboard wrapper is placed around packaged coils; (5) entire unit is steel-strapped to pallet.

ANOTHER NATIONAL-STANDARD FIRST in the field of bead wire development, the new vacuum package becomes a significant addition to the long list of National-Standard contributions to the rubber industry. For over fifty years, National-Standard has been the leader in bead wire research and development. Whenever you have a *wire-in-rubber* problem, let National-Standard put this experience to work for you. For additional information, write National-Standard Company, Niles, Michigan.

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If you'd like more information on Celanese FORTISAN-36 and its uses in industry, write to: Celanese Corporation of America, Sales Development Dept., Fibers Division, Charlotte, N. C.

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Photo courtesy Ohio Rubber Company, Willoughby, Ohio, a Division of The Eagle-Picher Company.

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This thimble-size shield works inside an automobile engine. It clings to a pulsing valve stem, prevents excessive loss of engine oil—yet allows enough oil to properly lubricate the stem. Obviously, a tough job for a tiny part.

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What can CHEMIGUM do for your product? For full details and technical assistance on CHEMIGUM—and a complete line of rubber chemicals and synthetic rubbers—write Goodyear, Chemical Division, Dept. E-9419, Akron 16, Ohio.

GOODYEAR

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Look closely at the PLIOFLEX packaging materials above and you'll notice that Goodyear has put some important "extras" into their design. Example: PLIOFLEX bags are distinctively marked and color coded for split-second identification, more efficient storage. Inside those 5-ply polyethylene-laminated bags are PLIOFLEX bales which can be talc dusted or wrapped in polyethylene film—depending on your need.

When it comes to shipping, once again—you call it. Bales or bags of PLIOFLEX can be shipped individually or in quantity on nonreturnable, no-charge wooden pallets. Prefer pallets? Palletized shipments come by truck or carload—take your pick. Bulk shipments? They arrive in special *unitized* containers—each one holding 33 film-wrapped bales.

"Seagoing Boxcars" may speed your order from our Houston warehouse. This unique sea-land system assures prompt, economical delivery to Eastern Seaboard customers. *Wherever* you need PLIOFLEX, you'll find it comes safely, swiftly from one of Goodyear's four strategically located supply points. And it comes ideally packaged for your *specific* purpose. More information on PLIOFLEX packaging and product advantages—plus latest *Tech Book Bulletins*—are yours for the asking. Write to: Goodyear, Chemical Division, Dept. E-9419, Akron 16, Ohio.

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As a stabilizer, WING-STAY 100 offers four key advantages: (1) incorporates in much the same manner as PBNA (2) provides unusually high resistance to oxidative degradation and flex-cracking, (3) is vastly superior to standard stabilizers in antiozonant activity, (4) serves as a better stabilization building block at no extra cost.

As an additive, WING-STAY 100 incorporates easily, does not accelerate the cure, does not bloom at normal levels and provides better over-all protection at lower cost.

But the best test is your own. WING-STAY 100 is available as an already incorporated stabilizer in PLIOFLEX 1500C, PLIOFLEX 1710C and PLIOFLEX 1712C. Or you can obtain it as an easy-to-handle, flaked solid. Samples—plus latest *Tech Book Bulletins* on WING-STAY 100—are yours for the asking. Simply write Goodyear, Chemical Division, Dept. E-9419 Akron 16, Ohio.

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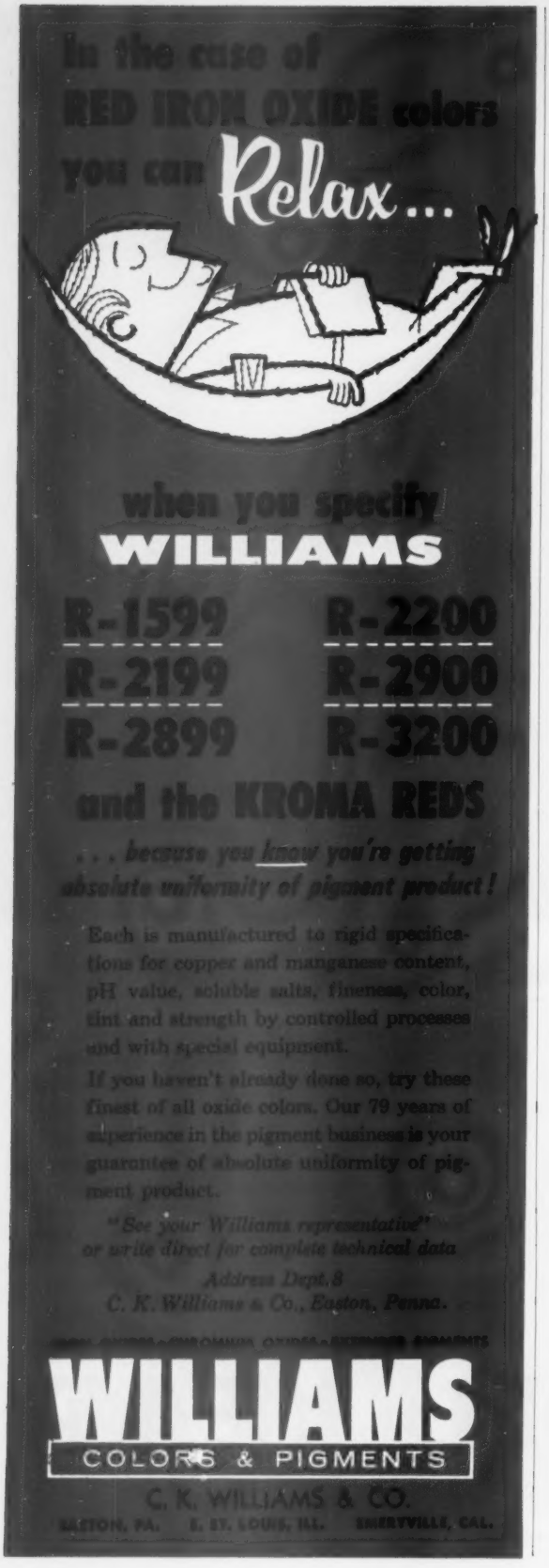
Pliolex, Wing-Stay—T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio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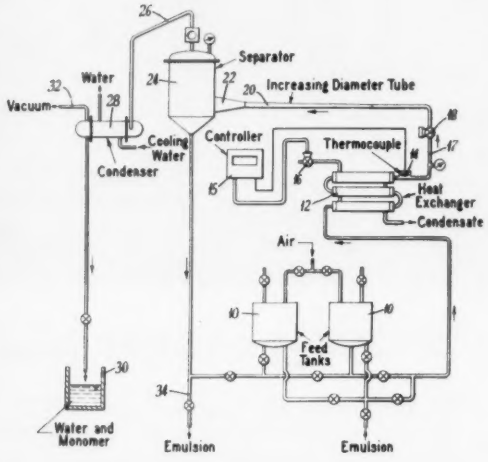
PATENT REVIEW

by Melvin Nord

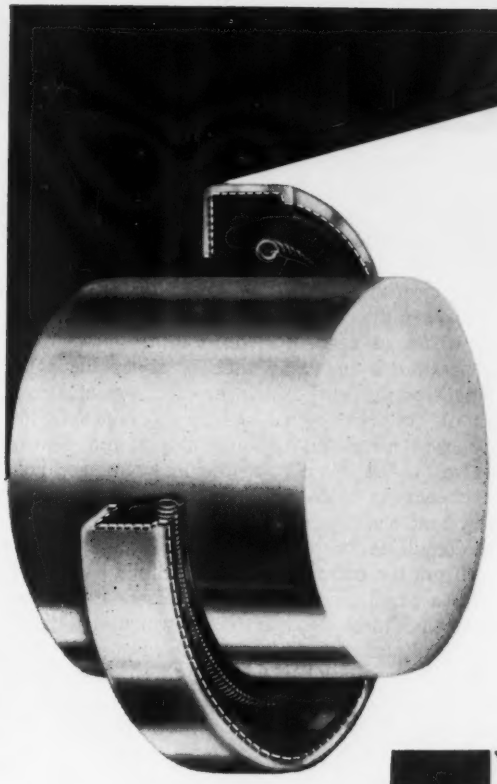
Concentration of Foamy Latices

U.S. Patent 2,853,127, issued September 23, 1958 to Lyman Sessen and assigned to Union Carbide Corp., relates to concentration of foamy latices simultaneously with the recovery of excess volatile components of the emulsion and employing a continuous flow-controlled vacuum evaporator. It is particularly useful for the concentration of latices produced in the emulsion polymerization of monomeric materials. For instance, it can be effectively used to concentrate the latices produced in emulsion polymerization of styrene or vinyl acetate, or by the copolymerization of butadiene and styrene. Moreover, the concentration is effected without coagulation of the emulsion.



As shown in the flow diagram, the emulsion to be concentrated and stripped is forced from feed tanks (10) to a heat exchanger (12) where it is heated to a temperature below its boiling point at the pressure existing in the heat exchanger. The temperature of the latex leaving the heat exchanger is controlled by means of a thermocouple (14) at the heat exchanger exit in conjunction with a controller (15) and control valve (16) in the steam line.

From the heat exchanger (12), the hot emulsion passes into an unheated constant diameter tube section (17) having the same diameter as the tube of the heat exchanger. The length of this unheated tube section should be such that when it conducts the normal throughput of liquid emulsion, the pressure drop that results due to liquid flow through this tube section is so great that sufficient pressure is maintained in the heat exchanger to



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PATENT REVIEW

prevent any cavitation or vaporization occurring therein. The feed tank pressure is regulated so that vaporization begins near the end or shortly beyond the end of this unheated tube section. Its function is to keep the zone of vaporization from traveling upstream in case of a drop in throughput. In general, this unheated tube is about the same length as the heat exchanger tube. Preferably, it should be constructed of glass or of a highly polished metal. In addition, a pressure control valve (18) is installed in the line after the heat exchanger in order to maintain the pressure within the heat exchanger above the vapor pressure of the emulsion.

From the unheated tube (17) the hot emulsion plus a small amount of vapor passes to another unheated tube section (20) which is highly polished and preferably constructed of glass. This tube section, in which vaporization occurs, has a progressively increasing diameter and generally is as long as the unheated constant diameter tube (17).

From the highly polished tube (20) the mixture of the emulsion and vapor passes through a short length of a funnel-shaped section of highly polished pipe (22) into the separator (24) maintained at high vacuum. This funnel-shaped pipe (22) decelerates the high velocity flow of the vapor-emulsion mixture to a velocity of less than 100 ft./sec. This effectively prevents the concentrated emulsion from striking the walls of the separator at a velocity so high that it would tend to coagulate the emulsion.

The vapor, consisting of a mixture of unreacted monomers and water, passes off from the separator through the vapor line (26), condenses in the condenser (28) and collects in the receiver (30), and then goes to the recovery system, or is drawn off through a vacuum line (32). The concentrated and stripped liquid emulsion drains out the hydraulic leg (34) to atmospheric pressure to be used as such, or, if desired, recycled and further concentrated.

Introducing Water Into Vulcanizable Masses

U. S. Patent No. 2,857,345, issued October 21, 1958 to Thomas R. Griffith and Donald W. MacGregor, assigned to Howard Smith Paper Mills Ltd., discloses a method for using lignin compositions for the introduction of water into vulcanizable masses.

The present invention is based upon the discovery that certain precipitated lignins have a high affinity for moisture and are capable of carrying in certain cases up to 150% of their own weight in water while retaining the physical characteristics of finely divided freely flowing dry powders

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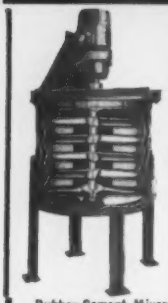
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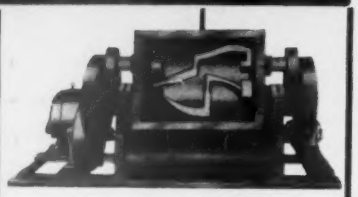
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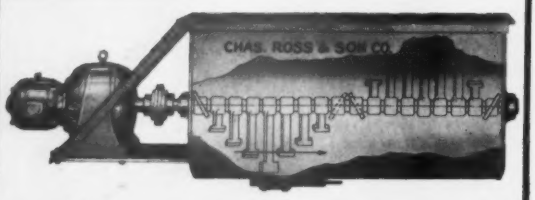
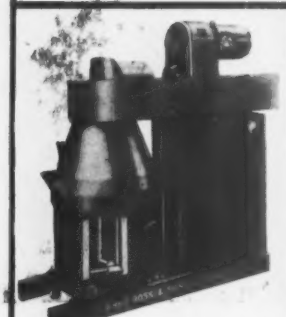
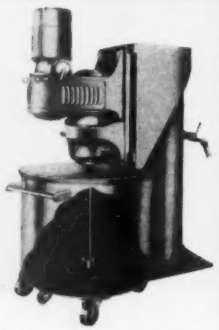
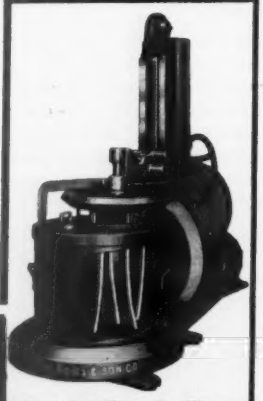
Rubber Reclaiming Mixers
100 - 1000 Gal. sizes




Double Planetary Change Can Mixers
1 - 150 Gal. sizes


High Speed Change Tank-Mixers
80 - 250 Gal. sizes

Heavy Duty Paste Mixers
25-1000 Gal. sizes


Heavy Duty Change Can Mixers
8 - 60 Gal. sizes

Also Dry Crushing and Pulverizing Mills, Three Roller Mills, Hopper Mills, High Speed Dissolvers or Dispersers, and Mixers of all types for Dry, Liquid, Paste and Heavy Paste Materials.
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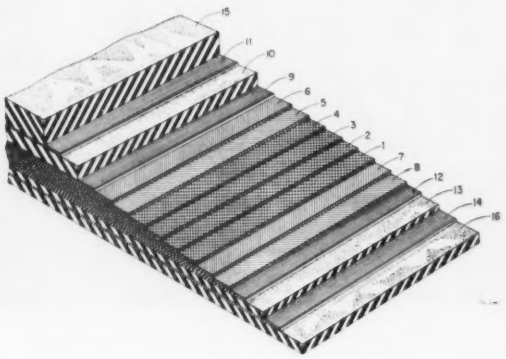
PATENT REVIEW

which are capable of being milled into vulcanizable masses in the same manner as a normal filler. These lignins, while they will retain moisture in this manner, are not themselves hygroscopic, so that what water they carry, is available to the reactions proceeding during the vulcanization process.

An example of a lignin which can be used in this way is Indulin A of West Virginia Paper Co. The patent also discloses methods of preparing other lignin compositions.

Conveyor Belt

U.S. Patent 2,850,420, issued September 2, 1958 to Arden R. Hacker and assigned to Goodyear Tire & Rubber Co., describes a flat conveyor belt for applications in which high impact resistance is desirable.



As shown in the schematic diagram, the internal section of the tension section is formed of four superposed layers (1, 2, 3, and 4) of material such as woven fabric. A layer (5) of material, such as pickless cord fabric, is positioned over layer 4 with the cords at substantially a 45 degree angle to the longitudinal axis of the belt. Immediately over layer 5 is a layer (6) of material similar to that of layer 5. Layer 6 is positioned so that the cords are at substantially a 90 degree angle with the longitudinal belt axis. On the other side of the inner portion of the tension section, layers 7 and 8, similar to layers 5 and 6, are positioned in a like manner.

Outwardly overlying layer 6 is a transverse cord breaker layer (9), and next is a layer (10) of resilient cushioning material, such as rubber, and another similar transverse cord breaker (11). Likewise outwardly overlying layer 8 are two transverse cord breaker layers (12 and 14) having a cushioning layer (13) between. An outer protective

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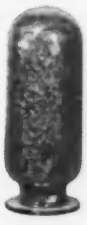

Type: Thermoplastic Hydrocarbon
Form: Flaked
Softening point (ball and ring): 210°—220°F.
Color (coal tar scale): 1½—2
Color (Gardner): 10-11
Color (Rosin scale): I—K
Acid No.: 0-2
Saponification No.: 0-2
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PATENT REVIEW

covering (15), preferably of rubber, overlies the breaker layer (11) and a similar cover (16) overlies the breaker layer (14).

It will be apparent that provision has been made for a breaker structure, not only on the load carrying side of the belt where the usual construction provides for impact absorption, but also on the pulley contacting side of the belt. The addition of an impact absorption structure on the pulley side causes an exceptional increase in the ability of the belt to absorb tremendous impact under unusual operating conditions.

Stabilizing Synthetic Rubbers

U. S. Patent 2,834,752, issued May 3, 1958, to Arnold R. Davis and Frank A. V. Sullivan, assigned to American Cyanamid Co., relates to the treatment of polymer and copolymer types of synthetic rubbers prior to compounding into vulcanizable compositions to stabilize them against further polymerization, cyclization or cross-linkage and gel formation during drying and storage.

The method disclosed involves the use of compounds of the type 2,2′-methylene-bis-(4,6-dialkylphenol). An advantage of these compounds is that their beneficial stabilizing or gel inhibiting effect extends into the manufacture of finished products, as well as providing exceptional stability during drying and storage prior to compounding. Acting as a stabilizer, these compounds are also effective during mastication and other processing operations. In addition, they have the valuable property of functioning as antioxidants to prevent aging through deterioration by oxygen of vulcanized rubber products.

Other Patents of Interest

Subject	Inventor of Assignee	Patent No.	Date
Steeping method for preparing foamable styrene polymer particles	Monsanto Chemical Co.	2,857,339-42	10/21/58
Tubeless truck tire	General Tire & Rubber Co.	2,857,951	10/28/58
Method of treating silicone rubber material	Dow Chemical Co.	2,858,237	10/28/58

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington, 25, D. C., for 25 cents each. Do not send stamps.

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Hycar nitrile rubber has wide application wherever gas, oil or chemicals may be a problem—or wherever you need extra abrasion resistance, strength or flexibility. There are many different types of Hycar rubber available—in latex form as well as dry rubber. For more information, write Dept. CB-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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These three polymers combine a range of oil and solvent resistance superior to other nitrile rubbers, providing improved tensile with higher elongation and lower moduli. Users are enthusiastic. They report reductions in mixing time and lower power requirements on mixing equipment. They also report better mold flow that reduces rejects, and better building tack for making rolls, tank linings, and similar products.

Samples of Hycar 1051, or the other two Hycar polymers in this series, are available with further information. To get them write Dept. CB-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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coming events

May 22. Connecticut Rubber Group. Panel Discussion on "The Use of Rubber in Aeronautical Application," Rapp's Paradise Inn, Ansonia, Conn.

May 25-27. Chemical Institute of Canada, 42nd Annual Conference, Halifax, Nova Scotia.

May 25-28. ASME Design Engineering Conference, Convention Hall, Philadelphia, Penna.

May 26-29. Societe de Chimie Physique, 9th Annual Meeting, Paris, France.

June 4. New York Rubber Group, Summer Outing, Doerr's Grove, Milburn, N. J.

June 5. Fort Wayne Rubber & Plastics Group, Summer Outing. Tippecanoe Country Club, Leesburg, Ind.

June 5. Quebec Rubber & Plastics Group, Golf Tournament.

June 6. Southern Ohio Rubber Group, Summer Outing.

June 6-7. Southern Rubber Group, Colonial Inn, St. Petersburg Beach, Fla.

June 9. Buffalo Rubber Group, Golf Outing, Lancaster Country Club.

June 9-12. Material Handling Institute Exposition, Public Auditorium, Cleveland, Ohio.

June 11. Washington Rubber Group, Annual Outing, Indian Springs Country Club, Silver Spring, Md.

June 11-13. Manufacturing Chemist's Association, 87th Annual Meeting, The Greenbrier, White Sulphur Springs, West Va.

June 12-14. Rhode Island Rubber Group, Silver Anniversary Summer Outing, Hotel Belmont, West Harwich, Cape Cod, Mass.

June 14-18. ASME Semi-Annual Meeting, Chase and Park Plaza Hotels, St. Louis, Mo.

June 15-19. American Society of Engineering Education, Annual Meeting, Pittsburgh, Penna.

June 17-27. International Plastics Exhibition & Convention, Olympia, London, England.

June 19. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 19. Boston Rubber Group, Summer Outing, Andover Country Club, Andover, Mass.

June 19. Northern California Rubber Group, Golf Outing, Green Hills Country Club, Millbrae, Calif.

June 21-26. ASTM Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

June 26. Detroit Rubber and Plastics Group, Summer Outing, Western Golf and Country Club, Detroit, Mich.

June 26-28. Los Angeles Rubber Group, Summer Outing, Las Vegas, Nevada.

July 6-11. Society of the Chemical Industry, 78th Annual Meeting, Glasgow, Scotland.

July 24. Chicago Rubber Group, Golf Outing, St. Andrews Country Club, Chicago, Ill.

Aug. 4. New York Rubber Group, Golf Outing, Forsgate Country Club, Jamesburg, N. J.

Aug. 21. Philadelphia Rubber Group, Golf Outing, Manufacturer's Country Club.

Sept. 10-11. ASME Wood Industries Conference, Multnomah Hotel, Portland, Ore.

Sept. 10-11. Society of the Plastics Industry, Midwest Section Conference, French Lick Sheraton Hotel, French Lick, Ind.

Sept. 12. Connecticut Rubber Group, Summer Outing.

Sept. 13-18. American Chemical Society, 136th National Meeting, Atlantic City, N. J.

Sept. 13-17. National Tire Dealers & Retreaders Association, Annual Convention, Washington, D. C.

Sept. 22-Oct. 3. London World Trade Fair, Alexandra Palace, London, England.

Sept. 24. Fort Wayne Rubber & Plastics Group.

Oct. 1-2. Society of the Plastics Industry, 15th New England Section Conference, Wentworth - by - the - Sea, Portsmouth, N. H.

Oct. 2. Detroit Rubber and Plastics Group, Fall Meeting, Detroit Leland Hotel, Detroit, Mich.

Oct. 2. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

Oct. 6. Los Angeles Rubber Group. Meeting sponsored by Plastic and Rubber Products Co., Biltmore Hotel, Los Angeles, Calif.

Oct. 7. Chemical-Finishing Conference sponsored by the National Cotton Council, Mayflower Hotel, Washington, D. C.

Oct. 8. Southern Ohio Rubber Group, Fall Technical Meeting.

Oct. 13. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo. N. Y.

Oct. 16. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 17-25. "Kuneststoffe 1959," International Trade Fair of the Plastics Industry, Duesseldorf, West Germany.

Oct. 20. Elastomer & Plastics Group, Northeastern Section, ACS.

Oct. 23. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Oct. 26-31. International Organization for Standardization, Technical Committee 45, Henry Hudson Hotel, New York, N. Y.

Oct. 26-28. Ninth Canadian High Polymer Forum, Guild Inn, Toronto, Ont., Canada.

Nov. 3. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Nov. 5. Rhode Island Rubber Group, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 6. Connecticut Rubber Group, Sports Night.

Nov. 6. Philadelphia Rubber Group, Annual Dance.

Nov. 8-13. Joint International Meeting of Division of Rubber Chemistry, ACS; Committee D-11, ASTM, and Rubber and Plastics Division, ASME, Shoreham Hotel, Washington, D. C.

Nov. 16-20. Automation Show & Conference on Materials Handling, New York Trade Show Building, New York, N. Y.

Nov. 17. Elastomer & Plastics Group, Northeastern Section, ACS.

Nov. 29-Dec. 4. ASME Annual Meeting, Chalfonte-Haddon-Hall, Atlantic City, N. J.

Dec. 3. Fort Wayne Rubber & Plastics Group.

Dec. 8. Buffalo Rubber Group, Christmas Party.

Dec. 11. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 11. Detroit Rubber and Plastics Group, Christmas Party, Hotel Statler, Detroit, Mich.

Dec. 11. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 12. Southern Ohio Rubber Group, Winter Meeting.

Dec. 18. New York Rubber Group, Christmas Party.

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9154	100	1500	12.5	HA	52	ISAF
9199	100	1500	—	—	50	HAF
9250	137.5	1712	7.5	HA	70	ISAF
9251	137.5	1712	—	—	60	ISAF
9252	137.5	1712	7.5	HA	55	SAF
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PLANTS AND WAREHOUSES: Akron • Boston • Chicago • Indianapolis • Jersey City • Los Angeles

• Deutsche Dunlop Gummicompagnie A. G. in Hanau, Germany (German Dunlop Rubber Co., Inc.) has paid a dividend of 15 per cent for the fiscal year of 1958. This was the firm's biggest year since 1946, when it resumed operations after the devastation of World War II. The firm, which manufactures tires of all kinds, had a net profit amounting to 7,920,000 German marks (approximately $1,980,000). Management of the firm has pointed out that although orders for equipping cars and trucks have diminished to some degree, sales of replacement tires have increased considerably. Competition has become stiffer and imports from various countries has depressed the selling prices, but generally speaking, the future looks very healthy.

In this connection, it is deplorable that German corporations do not publish their sales figures. When discussing the financial results of a business year, the foreign observer is forced to accept all figures at their face value and there is no way to determine the important ratios between sales and working capital, etc., which, as is very well known, is the practice in American financial reports.

• In recent months Soviet Russia has increased her purchases of rubber from Malaya and during the month of February, Russia purchased 22,000 tons (the average purchase during the months of 1958 was 5,000 tons). Trade circles explain the increased purchases of Russia by the fact that she may have difficulties obtaining enough rubber from Indonesia. In view of the volume of 22,000 tons bought in February from Malaya, Russia became the biggest customer. The United States bought 12,500 tons and England took 11,000 tons.

• The Italian company Eni-Agip, which is controlled by the Italian government, has sold 5,000 tons of synthetic rubber to Red China and the first shipment is alleged to have left the Italian port already. The synthetic rubber will be manufactured in a new factory of the Anic, a company subsidiary.

• A Chinese trade mission is now in Colombo to negotiate for the purchase of Ceylon rubber. The mission is discussing prices and quantities of rubber to be exchanged for rice in accordance with the Ceylon-China barter agreement. The delegation wants 50,000 tons of Ceylon rubber in exchange for 200,000 tons of Chinese rice. An arrangement will also be made to settle any balance due to either party in pound sterling. This deal is based upon the second five-year barter agreement, which will be terminated during the current year.

• A report, which was recently published in Penang, has proposed the formation of a Joint Rubber Council consisting of all producing countries in Asia. The secretary of the Panang Rubber Trade Association said that the association has advocated such a council for many years. It is believed that the matter is being seriously considered and that Malaya might take a lead towards its fullfillment. The council's discussions could include such matters as common problems inherent in the rubber trade and the exchange of knowledge and research, according to *Rubber Journal and International Plastics.*

• Shipments of all grades of Malayan rubber to Japan were increased from 8,604 tons in December, 1958, to 11,533 tons in January, 1959. According to trade circles, the Japanese had decided to buy Malayan rubber rather than Thai or Indonesian rubber on the advice of the Japan Rubber Association. It is assumed that the shipments during the months of February and March will exceed purchases made in January.

• According to the *Rubber Journal and International Plastics,* world leaders in natural rubber research and development plan to meet in Malaya next September to discuss means of advancing natural rubber in the race with synthetic. R. E. Michaux, chairman of the International Rubber Research Board and the International Rubber Development Committee, said that delegates would consist of men from countries which belong to these two organizations. He added that by teamwork among botanists, agriculturists and scientists, the natural rubber industry could achieve an even stronger position.

• The used car business is booming in West Germany. During 1958, 1,130,000 used cars, 13 per cent more than in 1957, were sold.

• During 1957, East Germany manufactured 1,450,000 tires for automobiles and motorcycles. In 1956, production of these tires amounted to 1,480,000 units. During the same year, production of synthetic rubber amounted to 72,312 tons, whereas in 1957, 74,280 tons were manufactured. It seems that the rate of production has been increased. In the first six months of 1958, 41,301 tons were produced. The production of plasticizers in 1957 amounted to 23,193 tons, 6.7 per cent more than was produced in 1956.

• The Achema 1961, 13th Chemical Engineering Exhibition Congress will take place at Frankfurt on June 9 to 17, 1961. Participants will have about 409,000 square feet of net stand space in addition to 43,000 square feet in the open air. Details on the exhibition are available from the Dechema, Frankfurt/Maine 7, Postfach, Germany.

• After negotiations with S. S. Smirnov, deputy director of V/O Hechmashimport, Rustyfa, Ltd., has received an order from Soviet Russia which is valued at more than $350,000, *Rubber Journal and International Plas-*

On the Continent (cont'd)

tics, reports. Rustyfa, a British consortium company, was founded in 1957 in order to supply plant and equipment for a large tire factory now under construction in the Ukraine.

The new order, which is mainly for rubber processing machinery, and those orders announced in 1957 and 1958, bring the total of Rustyfa's contribution to Britain's export drive up to $4,500,000, the statement said. To date, plant and equipment shipped by Rustyfa for the tire factory project is valued at nearly $1,000,000.

• A feature article entitled "Vulcanization of Dry Natural Rubber and Latex by Butyl Xanthogen Disulphide in the Absence of Free Sulphur," has appeared in the December 1, 1958, issue of *Transactions of the Institution of the Rubber Industry*. J. R. Dunn, of the British Rubber Producers' Research Association who is the author of the article, states that dry natural rubber and latex have been vulcanized at 100°C. in the absence of sulfur by butyl xanthogen disulphide, both with and without added zinc diethyl- or dibutyl-dithiocarbamate.

The addition of dithiocarbamate yields a product with much better physical properties and aging resistance than that containing the disulphide alone. Physical properties of the butyl xanthogen disulphide-dithiocarbamate vulcanizate are comparable with those of a dithiocarbamate-sulfur vulcanizate given the same cure time, and its resistance to aging at 100°C., both in the Geer oven and, particularly, as measured by stress relaxation is greater.

However, the author stated, the oven aging resistance of the conventional dithiocarbamate-sulfur cure is superior at 70°C. The xanthogen disulphide-dithiocarbamate system is cited as an example of a general phenomenon whereby the combination of an organic polysulphide and a dithiocarbamate should yield sulfurless vulcanizates with good aging properties and with a curing time dependent upon the stability of the polysulphide.

• *The Planter* is a platform for the expression of responsible opinion on matters concerning the planting industries in Malaya, Singapore, Borneo, Brunei, Labuan and Sarawak. Published in Kuala Lumpur, it has the largest circulation of any magazine of its kind in the East. This magazine carries quite a bit of advertising which shows a variety of American products that are not identified by name, but are usually advertised by the local agent. However, we were very pleased to note that there is a one page advertisement showing Long Island Ducks, plump, tender and succulent, ready-dressed for the oven and cellophane wrapped, from 4 to 4¾ pounds. Each of these ducks (there are three in the picture) are decorated with an American flag.

Evidently, the birds are very happy to be exchanged against latex because they seem to quack very lively. We would like to congratulate the Singapore Cold Storage Co., Ltd., for its enterprising spirit and we hope that a very considerable amount of trade will be developed between all the aforementioned countries and the United States based upon our excellent Long Island Ducklings.

• Dr. Noble, vice-president for research and development of Rubatex Products, Inc., in a discussion of nonuniformity of cellular rubber sheets, states that the nonuniformity of density of closed-cell sheets of cellular depends upon the condition of the press platens, especially the exterior condition of the platens. According to Dr. Noble, any uneven heating of the platens may cause considerable difference in expansion and hardness from one side to the other in the sheet produced on such a press. He also stressed that since these sheets are made under heavy pressure, the platens used must be sufficiently heavy and rigid and should not bend, so that the molds can close tightly.

If the molds do not close tightly, compound may get extruded at the opening as the blowing agent decomposes. The sheet thus obtained, although normal in size, will be less in weight and density than desired. Further, the edges of the sheet at which extrusion occurs will be softer than the remainder of the sheet.

• A paper presented before a meeting of the Asian Region of the International Conferedation of Free Trade Unions, held at Kuala Lumpur recently, discussed rubber price stabilization. The group considered recommendations that rubber producers and consumers should find a formula to stabilize the world price of rubber.

According to this paper, production costs should be reduced by improving the efficiency of labor and by increasing capital and planting high yielding material. It was also suggested that small holders should be organized into cooperatives and their replanting programs should be fulfilled within a specific time. It was believed that there should be closer cooperation between government policies and the plans of estate owners.

A scheme of organized state marketing for rubber should also be introduced. The question of a buffer stock for rubber could be discussed only when importing countries are ready to guarantee a minimum import quota of natural rubber. Delegates from Japan, Formosa, Hong Kong, Indonesia, Ceylon, India, Pakistan the Philippines, Thailand, South Korea, Singapore and Malaya attended the meeting.

• According to current reports, a new synthetic rubber, which has been designated "polyacetaldehyde" and which is said to have a high degree of heat resistance, has been developed by Professor Junji Furukawa, of the Kyoto University Technological Department. The new product, Professor Furukawa states, can be produced at approximately half the cost of other synthetic rubbers.

Polyacetaldehyde is made from acetaldehyde which has been polymerized with aluminum oxide used as a catalyst. The acetaldehyde that Professor Furukawa used for his experiments was made from acetylene synthesized from coke and natural gas. According to Professor Furukawa, petroleum or limestone may be used in the place of natural gas.

Here's how UOP 88® and 288® work to protect your rubber products

The ozone damage problem is becoming progressively more acute, and not all antiozonant compounds can cope with the increasing ozone levels. Reported instances of deterioration of rubber goods due to ozone attack are often quite dramatic. In a high ozone concentration area an unprotected rubber article may actually show ozone damage in a few days. Where ozone levels are not so high, ordinary base stocks may crack in a year or less, even under static conditions.

Here's proof

Absolute protection of your rubber products is assured when you use UOP 88 or 288. At the UOP research laboratories, new antiozonant formulations are continually being tested in a variety of base stocks. In addition, many manufacturers have tested UOP antiozonants in their own laboratories and in use. One customer recently reported that in a test of UOP 88 in their base stock, the UOP antiozonant afforded complete protection for 230 hours of exposure under fixed conditions of strain of 50 pphm ozone. Another antiozonant used in the same recipe failed and the tire cracked after only 30 hours exposure, while the unprotected base stock cracked in 5 hours.

Select right antiozonant for best result

How long and how well antiozonants will work for you depends on the potency of the antiozonant and the various factors involved in compounding. One may give satisfactory protection under static conditions but fail under flexing. Another will provide mediocre protection in either static or dynamic service. UOP 88 and 288, however, provide excellent, tried and proven ozone protection to rubber goods in storage and in use.

At Universal Oil Products Company research scientists and technicians work constantly, testing and improving the UOP family of antiozonants.

What influences effectiveness

Effectiveness of antiozonant compounds may be influenced by these major factors:

1. Type of polymer, natural or synthetic.
2. Curing system.
3. Reinforcing agent.
4. Concentration of compounding ingredients, including the UOP antiozonant.
5. Conditions of use, including type of stress, ozone concentration, temperatures.

Rubber Strip Tests Show Effectiveness of UOP Antiozonants

The two rubber strips above were inserted in an ozone cabinet under identical, controlled conditions. The rubber in the sample shown on the right did not contain an antiozonant and reveals marked ozone damage. The SBR sample on the left contains two parts phr of a UOP antiozonant and reveals no ozone cracking after equal exposure.

The concentration level of the UOP antiozonant must be related to other ingredients in the compounding recipe and to exposure conditions. Variations in type or concentration of ingredients reduce or enhance the final, lasting effectiveness of the antizonant.

About your product . . .

For one penny per pound of base stock of your product, UOP 88 or 288 antiozonants will provide years of ozone protection, prevent ozone cracking even under severe atmospheric exposure. UOP facilities and technical personnel are at your disposal for counseling on your particular antiozonant needs. Just phone, write or wire our Products Department.

Exaggerated conditions of stress and ozone concentration in the oven assure complete protection under any normal conditions.

In the Universal rubber laboratory, a rubber mill is used to incorporate experimental UOP antiozonants in various rubber polymers.

Every day we test a number of rubber recipes. The Scott Tester is used to measure physical properties of an experimental vulcanizate.

UOP 88® and 288®

RUBBER ANTIOZONANTS

UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road, Des Plaines, Illinois, U. S. A.

Check the PROFIT POINTS of DAY

Gearless PONY MIXERS

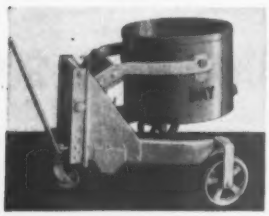
1. FAST, UNIFORM BLENDING of all ingredients being mixed. Agitator action insures against "dead spots" and stratification of materials—whether dry mixes, pastes or high viscosity liquids.

2. RUGGED, RIGID, TROUBLE-FREE construction makes DAY the standard of dependability. One piece cast frame assures absolute rigidity. Geared head motor drives agitators and can through roller chain and sprocket.

3. GUARANTEED PRODUCT PROTECTION from grease and oil. No bearings or stuffing boxes in the product zone.

4. QUICK, EASY REMOVAL OF AGITATORS from the batch. Counterbalanced head tilts easily by handwheel. Power tilting optional.

5. A MODEL FOR EVERY NEED with single motion or twin motion mixing action, one or two speed motors, in working capacities from 3 to 125 gals.



For full details, call in the Day field engineer in your area or write for Bulletin No. 500.

Mixer shown above, top, is Day Twin Motion Pony Mixer, having twin spindles with counter-rotating, overlapping blades. Shown immediately below is Day Single Motion Mixer. Day hydraulic lift trucks, left, and extra interchangeable cans, will further speed your production.

The J. H. DAY Co.

Division of The Cleveland Automatic Machine Co.

QUALITY MIXING, BLENDING, MILLING AND SIFTING MACHINES SINCE 1887

4918 Beach Street, Cincinnati 12, Ohio

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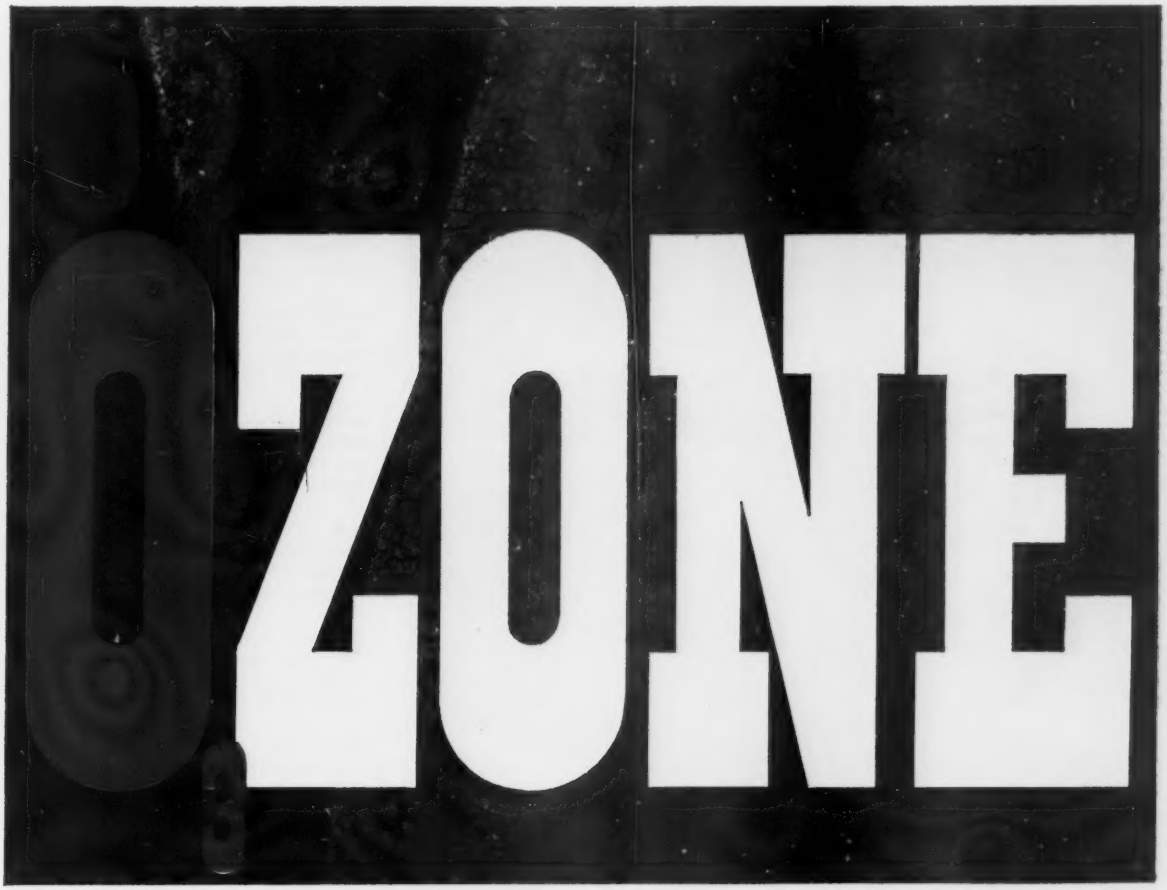

How to arrest its attack on rubber products

Ozone attack is now recognized as the major cause of cracking and checking in stressed rubber products.

The mechanism of this type of deterioration is attributed to the chemical attack of ozone upon the carbon-to-carbon double bonds of unsaturated elastomers. Through a rather complex reaction the double bond is broken. This places additional stress upon adjacent chains and increases their sensitivity to ozone attack. Thus a continuing reaction occurs, leading to the development of fissures perpendicular to the direction of the stress.

To combat the deteriorating effects of ozone, rubber chemists have several approaches open to them:

(1) Addition of waxes which migrate to surface areas

(2) Protection of surface areas with an inert coating

(3) Incorporation of antiozonants

Of these three methods, the use of antiozonants is the most effective for rubber products under stress. Antiozonants are easily incorporated into the rubber during processing and slowly exude to the surface during use. Because they interrupt the chain-breaking reaction between ozone and unsaturated elastomers, antiozonants provide a continuing protection which cannot be equalled by any physical method.

Eastman's Eastozone antiozonants protect rubber products more effectively at lower cost than do other types of commercially-used antiozonants. Using Eastozone antiozonants, compounders often can cut antiozonant requirements in half and still get the same ozone resistance, measured by static or dynamic exposure tests.

Give your mechanical goods or tire stocks maximum service life at minimum cost by incorporating Eastozone antiozonants in your rubber recipes. Ask your nearest Eastman representative for samples of Eastozone antiozonants or write to EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

Eastozone **Eastman Rubber Antiozonants**

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Chicago; Cincinnati; Cleveland; Framingham, Massachusetts; Greensboro, N. C.; Houston; New York City; St. Louis. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

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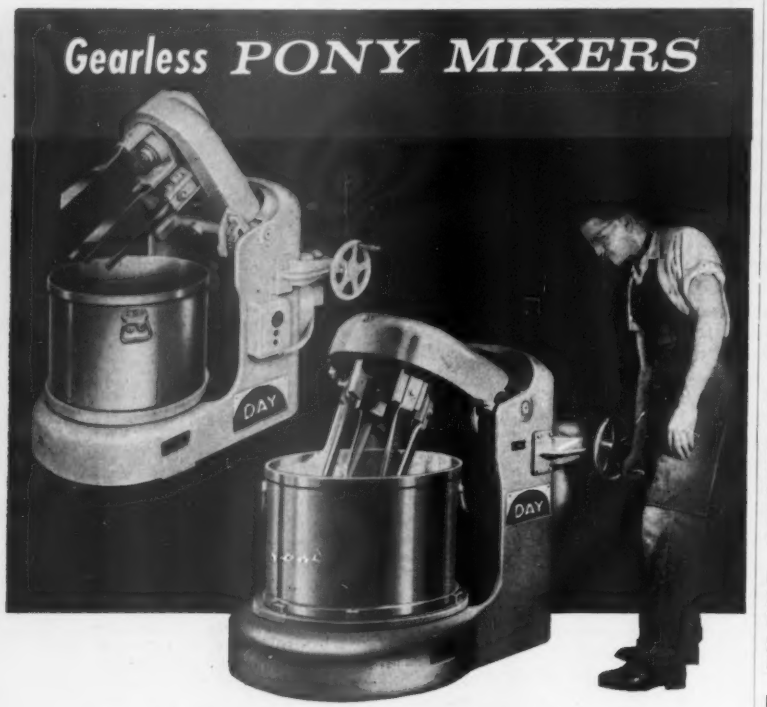

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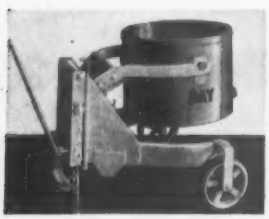

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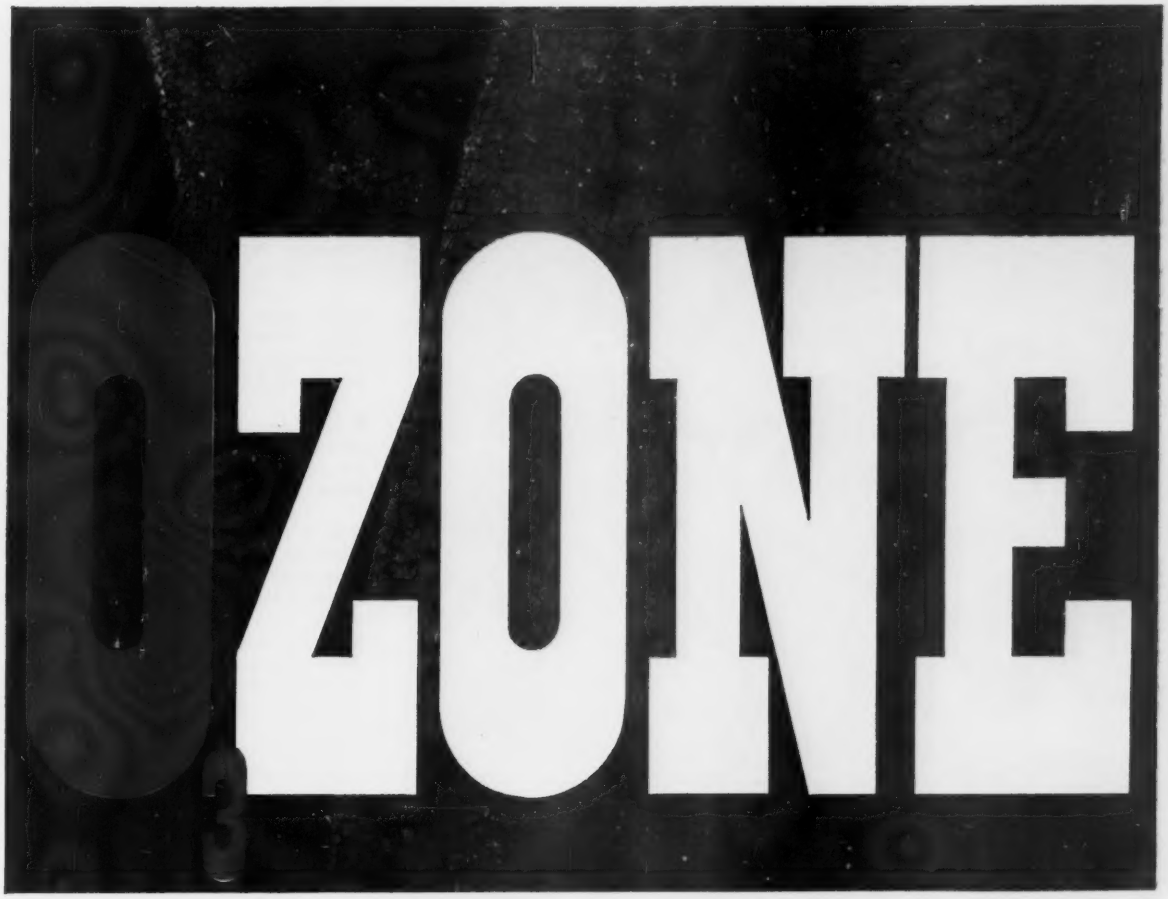

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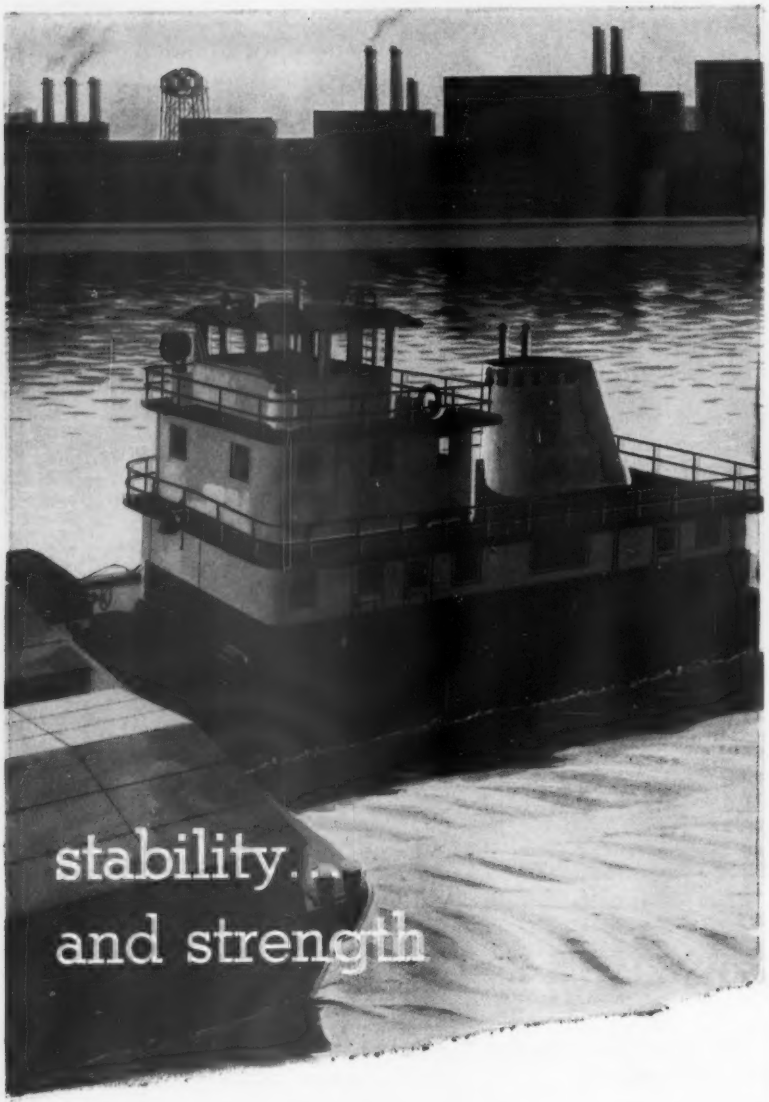


piccolastic
resins

Chemically inert and color stable, the PICCOLASTIC Resins combine toughness with outstanding water and chemical resistance.

The trademark of quality

PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION
CLAIRTON, PENNSYLVANIA

Distributed by HARWICK STANDARD CHEMICAL CO., AKRON 5, OHIO

News in Brief
(cont'd)

► Harwick Standard Chemical Co. has issued its latest technical data report on "Metasap 597," a permanent gelling agent for non-aqueous systems.

► The New York district office of Bailey Meter Co. has relocated its office headquarters to 150 E. 43rd Street, New York City.

► For persons who like something different, Dyer Products Co. is marketing The Surrey, a 1958 version of a vintage 1903 automobile.

► B. F. Goodrich Chemical Co. has published a comprehensive 36-page manual which gives a comparative evaluation of Hycar polymers.

► A new bulletin has been issued by Seely Instrument Co., Inc., which describes the line of drum type controllers developed by the company.

► Hummel Chemical Co., Inc., is offering a technical data sheet about its technical grade of calcium nitrate for use by the rubber industry.

► A technical bulletin about "Epon 1310" has been published by Shell Chemical Corp.

► A new 36-page brochure on clear and colored coatings for use on metal, plastics, glass and wood has been published by the Bee Chemical Co.

► Goodall Rubber Co. has opened a new office in New York City, located at 1270 Avenue of the Americas, Rockefeller Center.

► The Silicones Division of Union Carbide Corp. has released a new data sheet summarizing six rubber gum stocks.

► A complete farm tire data book that lists specifications and describes correct use and maintenance of tires for farm and industrial use has been published by the B. F. Goodrich Tire Co.

► Thiokol Chemical Corp., Trenton, N. J., has issued a technical service bulletin dealing with reducing surface tack of sunlight-exposed white butyl compounds. Ask for Bulletin No. 109.

► A fact booklet, "The Aristocrat of Floors: Rubber Flooring and Solid Vinyl Flooring," has been published by the Rubber and Vinyl Flooring Council of the Rubber Manufacturers Association.

ADDITION

ADDITION—Calcene® CO, a new grade of calcium carbonate, is the latest of Columbia-Southern's outstanding Calcene pigments. You now have three from which to choose:

CALCENE TM (Original product) Surface-coated for fast and thorough dispersion.

CALCENE NC (Non-Coated) Better in color than TM, but slightly harder dispersing.

CALCENE CO (Coated) Clean white to provide true color values in finished goods.

ADDITION—Calcene may provide your rubber products with additional advantages required for better looks, better wear, better price. Use Calcene for pastel or colored goods . . . for improved hot tear resistance . . . for an equivalent high level of uniform physicals at greater economy compared with more costly ultra-fine carbonates. Local stocks provide fast service in Boston, Hoboken, Chicago and Los Angeles. For an **ADDITIONAL** idea in your operations, why not investigate Calcene now. Price information and formulation suggestions may be obtained by contacting your nearest Columbia-Southern office or by writing Room 1929A, One Gateway Center, Pittsburgh 22, Pennsylvania.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

A Subsidiary of Pittsburgh Plate Glass Company • One Gateway Center, Pittsburgh 22, Pennsylvania

DISTRICT OFFICES: Cincinnati • Charlotte • Chicago • Cleveland • Boston • New York • St. Louis • Minneapolis • New Orleans Dallas • Houston • Pittsburgh • Philadelphia • San Francisco. IN CANADA: Standard Chemical Limited

Polyisoprene rubber...

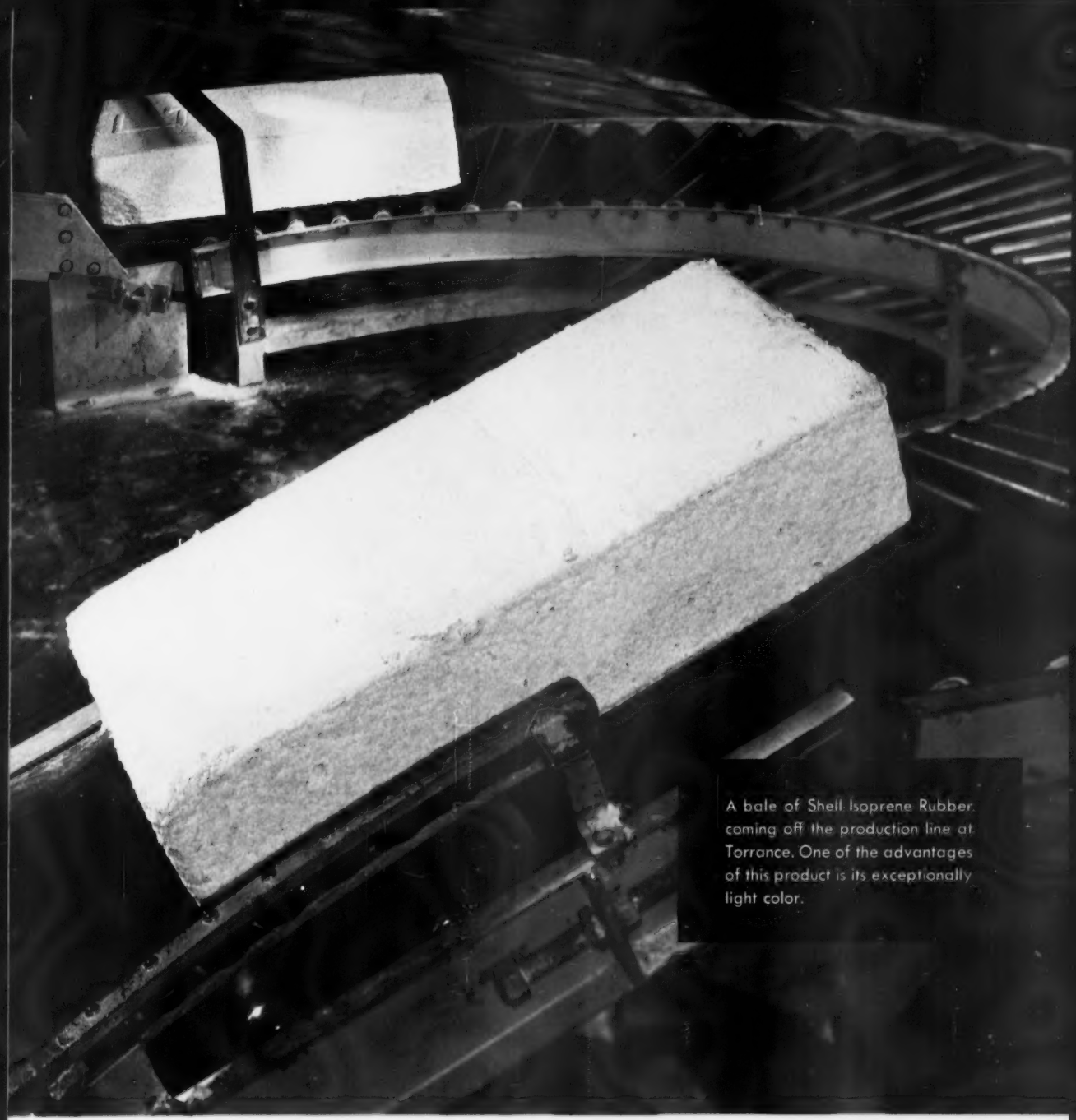
—now available in tonnage quantities

As one result of an extensive research and development program, Shell Chemical is now producing at Torrance, California, the world's first commercial synthetic polyisoprene rubber.

Now available in limited tonnage quantities for your evaluation, Shell Isoprene Rubber will soon be available in larger amounts when installation of additional facilities is completed.

This new polymer is closely similar to natural rubber in chemical and physical properties. It is excellent in color and uniformity, and offers the security of near-by availability of a man-made product.

Your letterhead request will bring technical information . . . samples for your evaluation.



A bale of Shell Isoprene Rubber coming off the production line at Torrance. One of the advantages of this product is its exceptionally light color.

SHELL CHEMICAL CORPORATION

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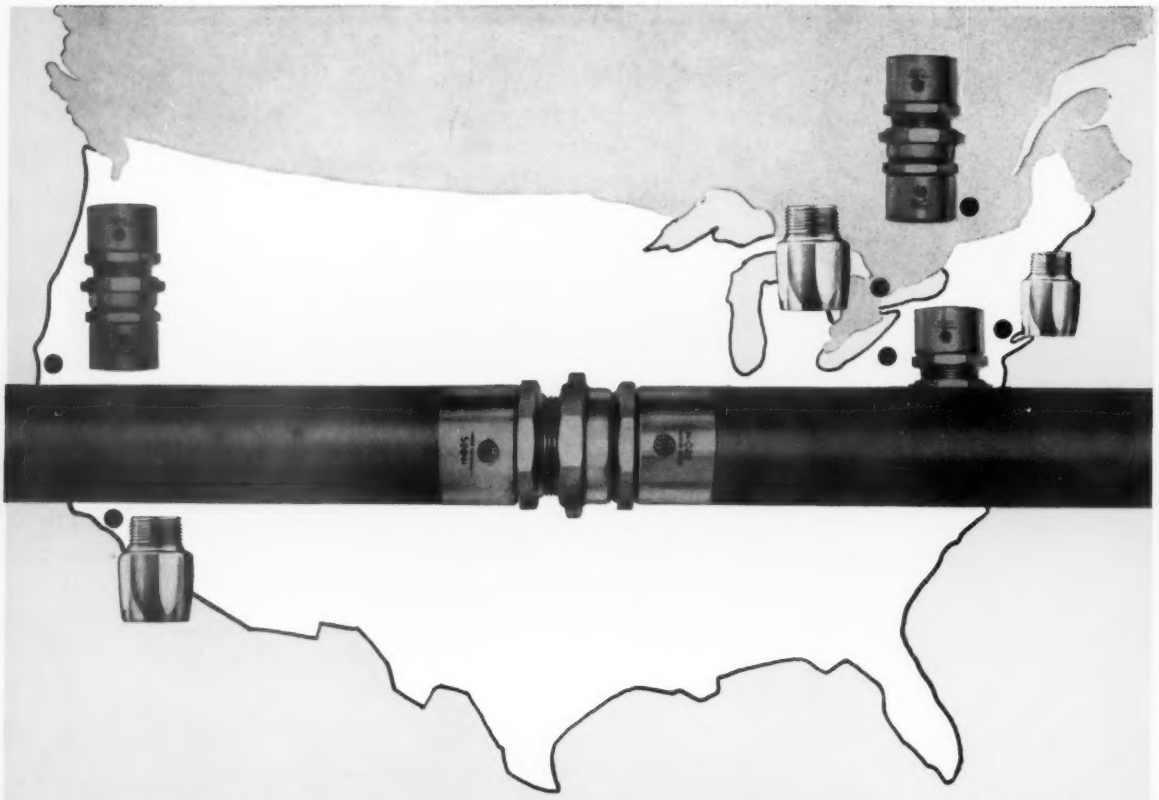

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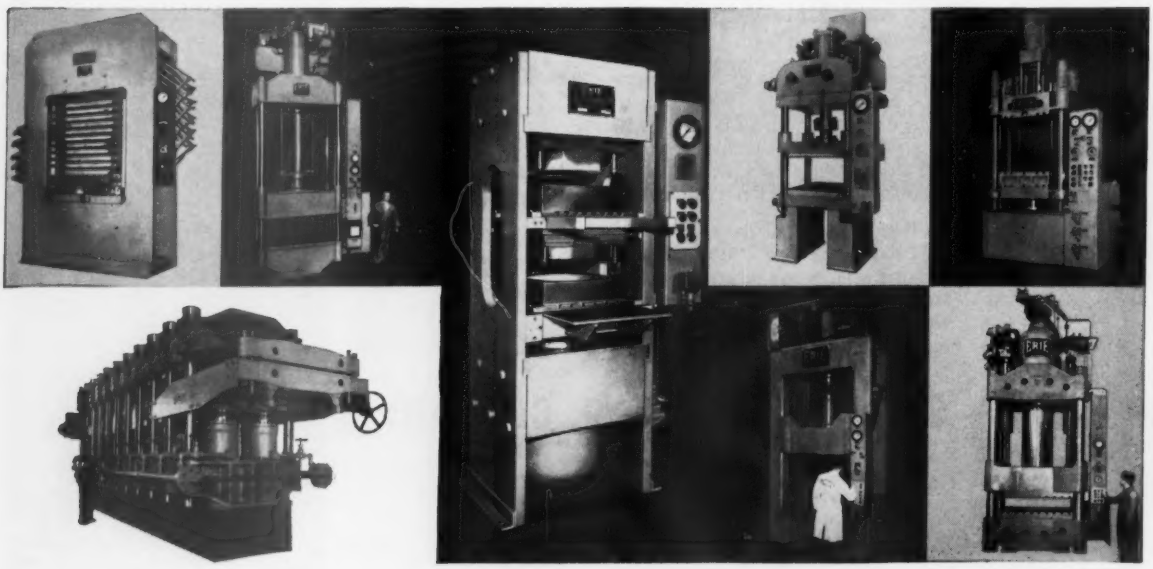

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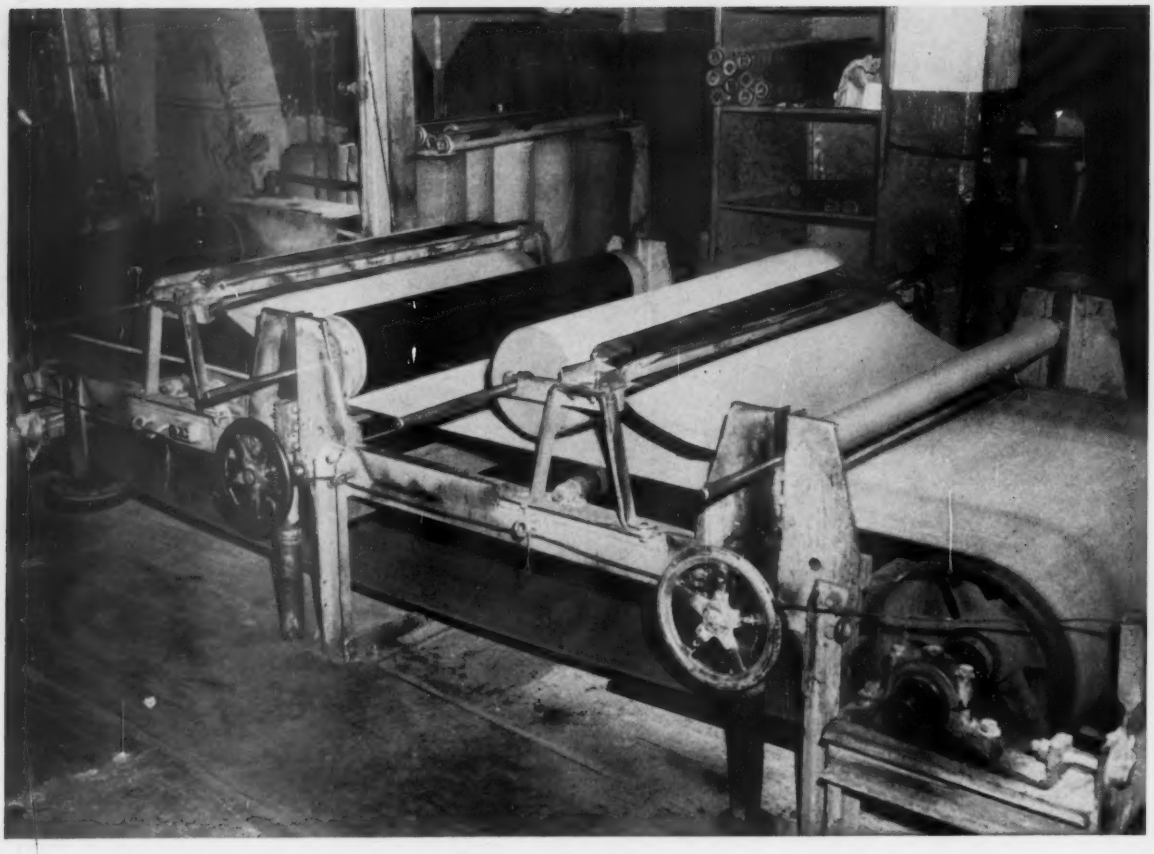

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Light-colored oil-extended polymers (1703, 1708, etc.)	CIRCOSOL® NS	It combines superior nonstaining characteristics with best processibility, imparts good physicals. Primarily an extender.
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Oil-extended polymers (1705, 1710, etc.) and natural rubber, Hypalon (where color is no problem)	SUNDEX® 53	It's a double-distilled aromatic plasticizer for tire-tread stock, rubber footwear, matting, toys, semi-hard rubbers, high-Mooney WHV.
Black master-batch polymers 1706, 1711, 1712, etc.	SUNDEX 1585	It's a new highly aromatic plasticizer for tough polymers where easy processing is desired. This is a distilled process aid.
Natural rubber, SBR polymers, regular and WHV neoprenes, acrylonitrile polymers	SUNDEX 85	It's especially recommended for very high loadings of WHV neoprene (from 75 to over 100 parts Sundex 85 to 100 parts polymer). Used in hard rubber goods.

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capitol cues

NO REAL BOOM IS LIKELY TO DEVELOP THIS YEAR—that's the prevailing view of government officials and economists. This does not mean that they expect the recovery to die down. On the contrary, they believe that there will be further rises, but the pace will be slow and moderate from today's already record high levels. A big boom in business isn't likely until 1960.

The basic ingredients of a real boom are just not present now.
- Government spending, for example, is rising at a slowing pace. So scratch this very powerful force for business expansion.
- Capital spending for new plant and equipment will go up only 4% this year, according to government estimates. In the last two postwar recoveries, the rise averaged something like 25%.
- Consumer outlays for durables are going well, but auto sales won't hit 6 million, as against 7 million in the past upturns.

BUSINESS WILL SEE ITS BEST PERIOD OF '59 THIS SPRING as a result of several special factors working together. One of them, of course, is the seasonal pick-ups in agriculture, construction, etc., that always come with warm weather. Another is the heavy hedge-buying of steel and other metals in anticipation of strikes and price rises. Finally, there's the fact that the rise in outlays for new plant and equipment is centering in this quarter.

Some economists believe that business may look too good this Spring. They fear that part of its bounce will come at the expense of the future. Things may slow this Summer—even if there's no steel strike—when metal orders return to normal.

UNEMPLOYMENT IS GOING TO REMAIN HIGH and continue as one of the most pressing of our economic problems until a new boom develops. There are now more than 4.5 million out of work even with business activity above the peak of the pre-recession period. There are few signs that the number will drop. The U.S. may have to live with twice as much unemployment as it's used to.

Two factors are operating to keep unemployment high:
- Productivity—output per manhour—has been increasing more rapidly this year; this gives increased output with a very few extra workers. So, the job market is not being helped.
- The workweek is being lengthened to handle increased orders, reducing the need to put laid-off workers back on payrolls.

CORPORATE PROFITS THIS YEAR WILL BE HIGHER—by $1 to $2 billion dollars—than even the most optimistic forecasters have been expecting up to now. The Treasury Department originally anticipated $47 billion, which would be $11 billion over 1958 and $1.5 billion higher than the 1956 record. Present estimates are now going as high as $52 billion. Those who talk of $50 billion are classed as conservatives. Higher earnings by corporations will begin to make the current level of stock market prices look reasonable.

capitol cues (cont'd)

SOME CUTS IN TRANSPORTATION COSTS ARE COMING this year. Railroads in the eastern part of the U.S. are actively trimming their rates to become more competitive with the long-awaited St. Lawrence Seaway, just completed. The Seaway is adopting low tolls in an effort to lure some traffic from overland facilities. Shippers may be able to save on cargoes for the East Coast, Europe, and Latin American destinations. Competition for traffic is also likely to bring some rate reductions by trucking lines and barge owners.

On the passenger side, there is likely to be some increase in rates. The airlines are considering some boosts on charges for jet tickets. This will probably affect overseas trips only.

ANOTHER BUMPER CROP YEAR IS IN PROSPECT for 1959, according to the estimates of the Agriculture Department. The government experts see good growing conditions, more acres in cultivation, and larger livestock herds. Farmers will plant 2% more acres this year, with most of the increase coming from the 17 million acres just released from the Soil Bank program.

Here's a rundown on the outlook for some of the major crops.

- Livestock: Meat production will go up about 8%; most of the hike will come in pork. Some cuts in prices are expected.
- Wheat: This year's harvest may dip 20% or so, to around 1.2 billion bushels—still more than the market can consume.
- Soybeans: Lower price supports and competition from corn will probably bring a drop in harvestings of around 7 to 9%.
- Poultry: Broiler, egg, and turkey crops will show rises.
- Vegetables: Corn, tomatoes, and beans are likely to be in good supply; onions, lettuce, and carrots will decline.
- Fruits: Pickings of oranges and grapefruit will be greater.

BUSINESS IN CANADA IS RECOVERING MORE SLOWLY than in this country. Normally, the cycle for our Northern neighbor follows ours pretty closely. Its economy is tied to ours because we're its biggest customer—by far. But this cycle is different because we're taking less oil, metals and farm products this year—and these are the mainstays of the Canadian economy.

- Industrial production in Canada has risen only 3% to 4% since the recession's low, as compared with 13% to 14% in the U.S.
- Nonfarm employment is up 2%, about the same as in this country.
- Total output of goods and services—Gross National Product has regained 3% of the loss and is now 2% over the old peak.

Despite the slow rate of rise, the economy of Canada will probably reach new record highs during the rest of this year.

PROSPECTS FOR A NATIONAL FAIR TRADE BILL are dimming. The measure, which would let maufacturers set their own retail prices, probably will be reported favorably by the House Commerce Committee and may pass the House at this session. But, it has not aroused much support in the Senate. The bill drew only two sponsors when it was introduced in the upper house. So, backers of the legislation may delay their Senate drive until next year.

Even if the measure does clear both the House and Senate, it may well run into a veto by the President. Ike's advisers see it as a breach of antitrust laws. His veto would stick.

Happiest marriage of carbon black and rubber produces new Ameripol Micro-Black

When you join carbon black and rubber . . . and hope for the best possible dispersion . . . why make it a "shotgun wedding"? Why injure both of them with excessive compacting and repeated dry shearing? Goodrich-Gulf has solved this problem with "high liquid-shear agitation" in the production of new Ameripol Micro-Black masterbatch.

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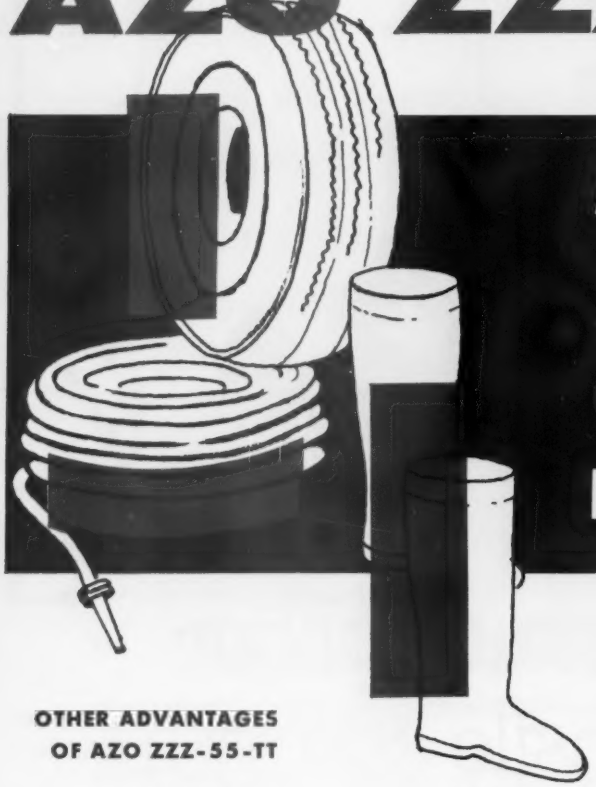

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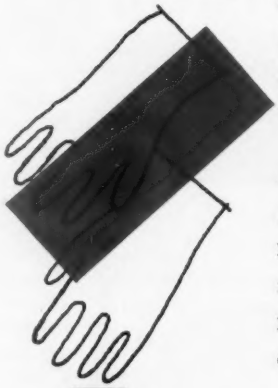

AZO ZZZ-55-TT is heat treated in a controlled atmosphere that removes objectionable trace elements and enhances mixing and dispersion. In addition, it is treated chemically to improve mixing and dispersion properties to an even greater degree.

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As Soule Sees It...

by Kenneth J. Soule

Rubber Roads

In the Spring, a young man's fancy is supposed to turn lightly to thoughts of love. However, when you are no longer young, and perchance have some free time for driving in the country, your fancy may be intrigued by more mundane things, such as chuck-holes in the roads and/or extensive wash-boarding.

When winter is putting up a last-ditch losing battle, when the first flower shoots poke their brave, green, nose-cones through the frozen earth, and an impetuous robin or two puts in a premature appearance, secondary highways seem to hatch hosts of king-size holes to bedevil the unwary motorist. Many roads also tend to suffer from tired-binder, or some sort of nervous break-up. Bounding around for a while on these asphalt obstacle courses, makes one wonder how some of the proposed or suggested improvements in road construction are progressing, involving, as they do, the use of rubber additives in various forms.

The idea of mixing rubber with asphalt for use in road surfacing is not new. Test sections of such pavement were laid in the Far East as long ago as 1929 and later, in England and the Netherlands. Probably, the road which has been in use for the longest period of time is a stretch of paving between Amsterdam and the Hague which has been carrying heavy traffic for over 14 years. When it is considered that the Germans used this highway during their invasion of the Netherlands and the Allied forces also used it while pushing the Germans back out of the country, it is quite remarkable that the pavement is reported to be in very good condition and that it "so far has required no maintenance."

In the North American continent, an active program is in progress to study the usefulness of the natural rubber-asphalt paving, with test roads having been installed in at least 31 of the 50 states and in five of the Canadian provinces. In addition, other elastic materials besides natural rubber have been proposed and tried as ingredients in rubber roads. These have included reclaimed rubber, styrene rubbers, neoprene and some resins.

The most extensive group, the neoprene-asphalt roads, are reportedly undergoing tests in about a dozen states which are located in various parts of the country from Delaware to California. All rubber-asphalt test installations are carefully supervised and performance records meticulously checked and double checked since the potential savings in road construction and maintenance costs cannot fail to intrigue highway engineers as well as all other interested parties, including the lowly taxpayer.

Regardless of which elastic (rubbery) additive is used in these asphalt modified roads, the properties which the rubber increment gives to the paving, in greater or lesser degree, are: (1) Improved elasticity; (2) Better resistance to shock over a wider temperature range; (3) More tenacious bond to the cover stone; (4) Reduced tendency for weathering to work through to the road base.

Main Bout

A new battle of the century is shaping up and in fact, the gage has been hurled and the challenge accepted. We refer to the titanic struggle, now underway between rayon and nylon, covering the market for tire cord used in all types of automobile tires. Since a total yearly consumption of perhaps 450 million pounds of materials is involved, the stakes are obviously worth fighting for.

It is not news that automobile tires are readily available with either rayon or nylon cord bodies. This has been true for several years. The feature which is new and which may prove confusing to the consuming public, is that each of the competing groups has undertaken direct and indirect advertising in support of its products, and is making performance claims for tires made with its particular fiber, which are contradictory, to say the least.

Another complication is that while DuPont is the largest producer of high tenacity nylon tire cord, the firm also makes and sells large quantities of rayon tire cord. The most vocal exponent of the use of viscose rayon tire cord is Tyrex, Inc., which is made up of the other leading rayon producers: American Enka; American Viscose; Beaunit; Courtaulds (Canada); and Industrial Rayon. Their product, logically enough, is called "Tyrex".

The advertising campaign sponsored by Tyrex makes use of a wide variety of trade publications, home magazines and daily newspapers. Total coverage, in terms of potential readers, is estimated to be around 80 million people. Another device used is the report presented to a trade meeting, such as the recent convention of the National Automobile Association. Here, the results of a study, comparing tires using Tyrex viscose rayon and nylon and made by "an independent research organization" were presented. These were said to show the superiority of the rayon tires in each of four respects: (1) Tread mileage (24 per cent increase); (2) Reduced groove cracking; (3) Very much less tendency for the rubber to separate from the cord at high speeds; and (4) Superior impact resistance.

At the moment, it is not quite clear how the nylon exponents plan to present the case for their cord product. One method now in use is the short commercial, sandwiched into popular TV shows, which emphasizes emotional appeal rather than a scientific presentation. However, the technical approach is not being overlooked and along these lines, we have noted a recent article in one of the trade journals.

Here, it is stated categorically that nylon offers two outstanding advantages in tires: (1) Better resistance to high temperatures, such as may be developed by

As Soule Sees It (Cont'd)

high speeds and overloads. In comparative tests, nylon tires outscored rayon 3 to 1; (2) Better resistance to bruising. In both laboratory and service tests nylon showed up best. In actual taxi service, it was claimed, only two nylon tires out of 264 suffered impact breaks while 20 rayon tires out of 265 failed by impact breaks.

This is all confusing if anyone worries about it (that is, anyone among the consuming public). Perhaps in about a year, it will be possible to know the results of all this advertising effort, although it is doubtful that there will be much agreement regarding cause and effect. For the record, it may be worth while to jot down a few basic facts as they apply at present: (1) In the replacement tire business, nylon has a slight lead over rayon for first place, while in bus and truck tires, rayon leads nylon; (2) On original equipment (new cars) rayon tires are being used exclusively; (3) In the last quarter of 1958, nylon tire cord production jumped 1¾ million pounds, while in the same period, rayon cord production soared 11½ million pounds.

In any case, there is one sure thing about the entire matter. Nowadays, the art and science of tire manufacture is so advanced that the tire user need have no worry about the life and the serviceability of any first line auto tire, whether it be made of rayon or nylon. This is one time when the *emptor* doesn't have to *caveat*.

What's in a Name

Evidence continues to pile up that adhesives are steadily becoming a more and more important part of the industrial picture and that their value is finally becoming widely recognized. Consider some supporting data picked up at random while leafing through trade papers:

(1) ASTM holds a two-day fall session of Committee D-14, on Adhesives in Washington, D. C. A spring meeting of all 12 sub-committees of D-14 will meet in April, 1959, at Ann Arbor, Mich.

(2) A Symposium on Adhesives was a feature of the two-day November meeting of the Chemical Market Research Association in St. Paul, Minn.

(3) The Gordon Research Conference has scheduled an entire week's session on the "Chemistry of Adhesion", during August and September, 1959.

(4) New king-sized adhesive plants are springing up all over the country.

(5) Thread, nails, rivets and even welds are gradually being replaced by special adhesives, in the shoe, upholstery, automotive, building and aviation industries.

(6) All segments of those involved in adhesives, either as producers, suppliers or consumers, have a focal point where they can find the latest information on all phases of the subject. I refer to the fine new trade magazine, *Adhesives Age*. As I study it, I am impressed with the excellent coverage it offers and the consequent saving in time which it makes possible for busy chemists as well as purchasing agents and the consuming public.

At the same time that adhesives have achieved recognition as a separate and important segment of the rubber and plastics industries, I am delighted that the name "adhesive" has largely superseded the old term, cement. The new designation is more descriptive and it may also prevent unfortunate and embarrassing snafus such as occurred in the old days. One small honest-to-goodness incident will illustrate what I mean.

During the first World War, the Chemical Warfare Branch of the U. S. Army was primarily concerned with the production and methods of use of poisonous gases and the development of face masks to protect soldiers from these gases if and when they were used against our troops by the enemy.

We are interested only in the gas mask portion of the problem here. In the New York City area, there were two Army installations working on this problem, both of which were located in Long Island City. The factory, which produced finished masks, chiefly employed civilians (mostly women), but the director of the plant was a regular Army officer. A few blocks away, there was another Chemical Warfare plant, staffed almost entirely by chemists and engineers who had swapped their industrial jobs for Uncle Sam's Khaki. Many came from Akron rubber shops.

As it turned out, they were rarely called on to use their technical skills, but served chiefly as human guinea pigs to test the constantly changing designs of gas masks. Masks were worn into sealed rooms filled with tear gas to find out how adequately they would protect against fumes. The men underwent strenuous exercises while wearing masks. This served as a practical test of the usefulness of the masks under combat conditions. Other extended breathing tests were performed to check the comparative ability of experimental filter media to absorb toxic gases.

Although, as noted above, both Chemical Warefare installations were U. S. Army controlled and were only two or three blocks apart, neither officer in charge was officially aware of the existence of the other plant, or, at least, of the make-up of its personnel. Therefore, when the Gas Mask factory began to have serious trouble with its rubber cements, the obvious thing to do was to send an S. O. S. to the War Department. Since, in the Army, words are vital and precious, it is probable that the plea was simple and direct, such as "Urgent, send cement experts immediately."

Within a week, a squad of Army Engineers descended on the horrified lieutenant in charge of the gas mask factory. Squad members were fully equipped with overseas gear, hobnailed boots and trenching tools and had vision of France dancing in their eyes. Alas! These boys were in fact *Cement Experts*, but the cement they dealt in was Portland, not rubber cement. They had been trained to build concrete gun emplacements, block houses, or what have you, and rubber cement was a complete enigma to them.

It is hardly necessary to say that our poor engineers never got back to their original base or to France. They sweated out the six months before the Armistice, drilling and marching in the fields of Long Island City instead of Flanders field. If any of them should happen to read this account, I am sure they will be happy to know that rubber cements are now adhesives. Their engineer sons and grandsons should be safe from the recurrence of the comedy of errors which stuck them so firmly in Long Island City through the medium of a little rubber cement—misapplied.

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Photos show you why Farrel rebuilding assures

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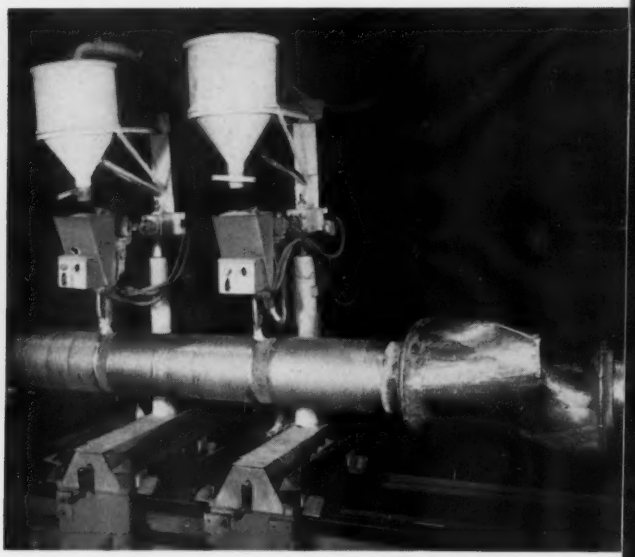
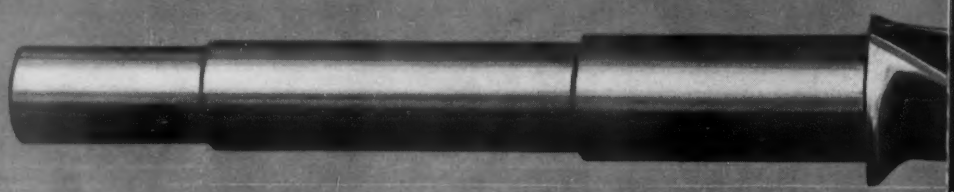
The body of the rotor is built up to its full original size. In this photograph, the finest-grade Stellite is being applied to a blade by oxyacetylene process.



Automatic setup for applying steel to build up rotor journals so they can be machined to original size. Process is submerged-arc welding.

Rebuilt rotor, completely restored to original working efficiency.



For an idea of the thorough approach to Banbury® mixer rebuilding at Farrel, note the illustrations below. They cover four important stages of rotor rebuilding. In all, these critical parts are rebuilt in a sequence of 42 separate operations, including three nondestructive tests for soundness. Result: rotors that are just as good as new and, in fact, carry the same guarantee. The rebuilding of other components is handled with similar thoroughness.

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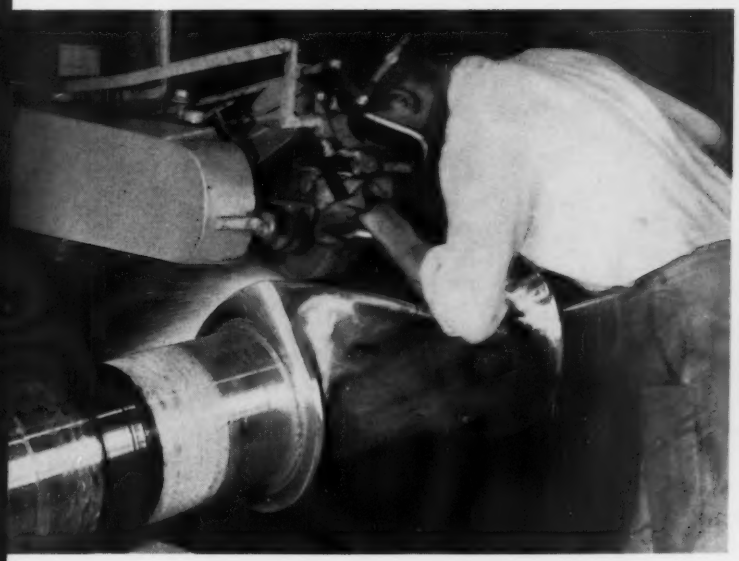
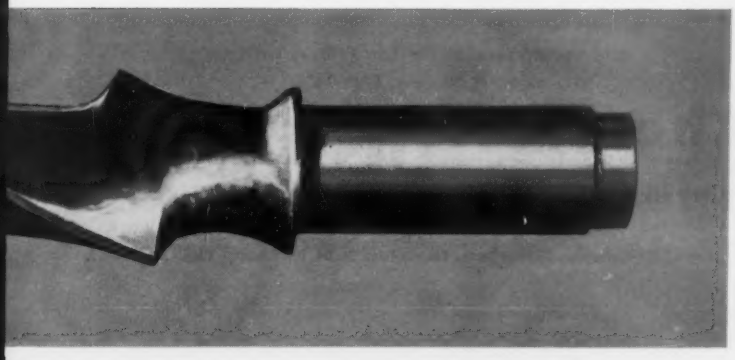
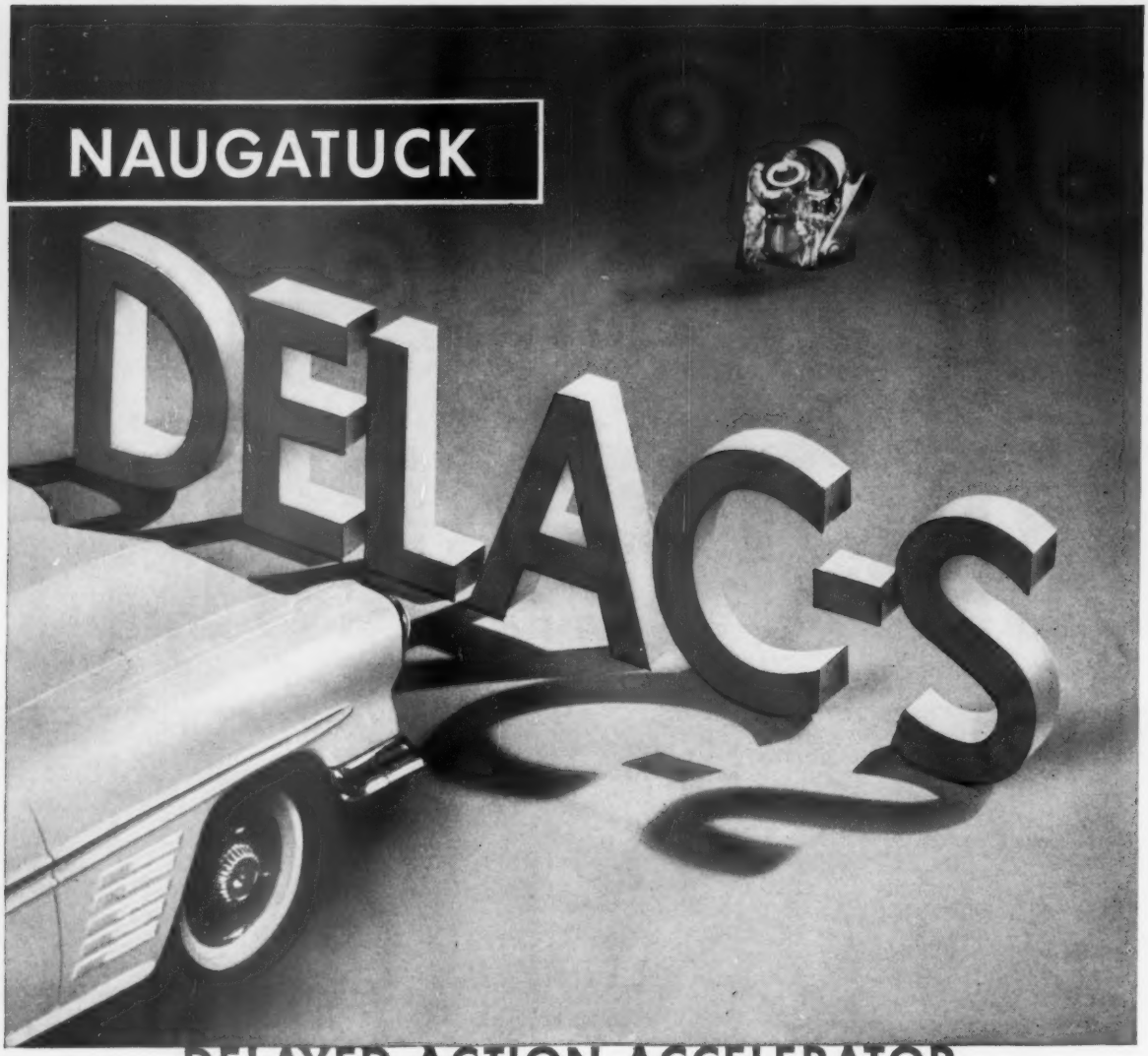


Here the rotor shape is being restored through swing grinding. Original blueprints guide Farrel craftsmen at every stage of rebuilding.



Final polishing of the Banbury rotor body is done with a motorized emery belt.



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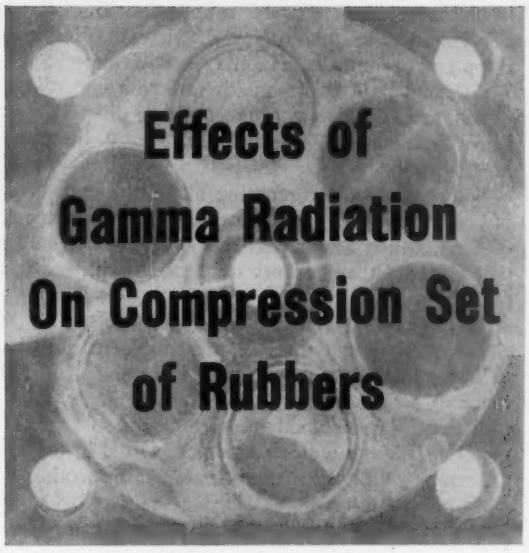

Effects of Gamma Radiation On Compression Set of Rubbers

How different elastomers are affected by various dosages of radiation

By R. E. MORRIS, R. R. JAMES and F. CAGGEGI

Rubber Laboratory, Mare Island Naval Shipyard, Vallejo, Calif.

IN ORDER to design equipment for operation in a nuclear radiation field, it is important to know the effects of the radiation on the materials to be used in the structure. The working life of a material under these conditions depends on the length of time that its properties which are critical to the operation remain at adequate levels. The chemical changes which occur in a material during irradiation are of consequence only insofar as they affect its physical properties, or affect the physical properties of adjacent materials.

Rubber items are often necessary parts of mechanical devices, particularly for sealing fluids at joints and at sliding contacts of hydraulic systems. The unique properties of a rubber vulcanizate which make it outstanding for this purpose are its softness and its recovery stress against the restraining surfaces. Its softness enables it to conform to minor irregularities on the restraining surfaces, and its recovery stress prevents the passage of fluid. These are the critical properties which must be retained by gaskets and seals used in nuclear radiation fields.

Softness, or its inverse, hardness, is an easy property to measure and is being employed by this laboratory as a criterion in the development of vulcanizates for this application. The objective is to find a vulcanizate which undergoes the least change in softness after extensive exposure to nuclear radiation. The ability of a vulcanizate to retain its recovery stress while under compression is a more difficult property to measure, and therefore is not being used as a criterion at this stage of the development work. Instead, the compression set of the vulcanizate after irradiation is being used. Compression set is generally regarded as being directly related to stress relaxation *(1)*.

Considerable information on the deterioration of rubber vulcanizates by nuclear radiation has already been obtained. This information has been ably summarized by the Radiation Effects Information Center *(2)*. The only previous data concerning the effect of radiation on compression set were obtained by Bopp and Sisman *(3)*. They compressed specimens of various types of rubbers to 75% of their original height and exposed them to neutron and gamma radiation in a water-cooled channel of a graphite reactor. They found that natural, styrene and acrylonitrile-butadiene rubber vulcanizates exhibited the least compression set after irradiation. Silicone, Thiokol and butyl rubber vulcanizates reached 100% set and the latter was depolymerized to a tarry fluid. A neoprene vulcanizate attained a high compression set even though not irradiated. This latter behavior was not discussed by Bopp and Sisman. It was perhaps due to the tendency of neoprene to crystallize when compressed at moderate temperatures.

Note: The opinions or assertions in this article are those of the authors and are not to be construed as official or as reflecting the views of the Navy Department or the Naval Service at large.

The investigation described here differed from that of Bopp and Sisman in the following regards: more types of rubbers were tested; the rubbers were compounded in such a manner that the vulcanizates met definite requirements for initial softness and resistance to compression set engendered by heat; and only gamma rays were used for irradiating the compressed specimens.

With regard to the use of gamma radiation in lieu of the more complex radiation emitted from nuclear reactors, Bopp and Sisman *(3)* and Charlesby *(4)* believe that similar changes are produced in polymers by different types of nuclear radiation when the effects of the radiations are compared on the basis of equal energy absorption. Gamma radiation is usually more convenient to employ for testing purposes than other nuclear radiation (alpha, beta, slow neutrons or fast neutrons) because it has greater penetration and it does not induce radioactivity in the samples. Good penetration is desirable in order that many rubber specimens in a metallic container can be subjected throughout to an even dosage.

The variables studied in the present investigation of the effect of gamma radiation on compression set were: type of rubber, type of curing agent, presence and type of antioxidant, and dosage of radiation.

Recipes and Properties of Vulcanizates

The rubbers selected for preparation of test specimens are listed in Table I. The chemical nature of each rubber is defined by the information furnished by its manufacturer. Butyl rubber and Thiokol were not included in this survey in view of findings of Bopp and Sisman. Although a silicone rubber, Silastic 7-170, had poor resistance to radiation according to these authors, silicone rubbers which differed chemically from Silastic 7-170 were included in the present investigation.

Sulfur was used for curing all of the vulcanizates of styrene rubber and acrylonitrile rubber except one of each, which was cured with DiCup 40C (dicumyl peroxide). Other rubbers were cured with the usual ingredients.

Loughborough and co-workers at the B. F. Goodrich Co. *(5)* found that the presence of certain antioxidants in rubber vulcanizates increased their resistance to deterioration of tensile properties by gamma radiation. They coined the term "antirad" for these materials. Many antioxidants were tested in the present investigation to find antirads for protecting vulcanizates against compression set caused by gamma radiation. The amount of antioxidant compounded into the various rubbers was generally 5 parts per 100 parts by weight of rubber. Antioxidants were not compounded into rubbers to be cured by DiCup 40C or other peroxides since they interfered with the peroxide cure.

The recipe (except for the Silastics), cure, tensile strength, ultimate elongation, Shore hardness and hot compression set of each of the vulcanizates tested in this program are given in Table II. The recipes for Silastic S-2048 and Silastic LS-53 were not known because these stocks were compounded by their manufacturer. The physical properties were determined in accordance with the applicable ASTM test methods. Each tensile strength and each ultimate elongation reported are the averages of results obtained on six dumbbell specimens. Shore A hardness is the 15-second reading made on a ½-inch thick specimen. Hot compression set is the value determined after 70 hours at 212°F. (ASTM D395-55, Method B).

The recipes for all of the vulcanizates, except those of Philprene VP-25, Viton A-HV and the silicone rubbers, contained fast-extruding furnace black as a reinforcing filler. The Philprene VP-25 vulcanizate contained no carbon black since adequate properties were obtained without its use. The Viton A-HV vulcanizate contained medium thermal black. The Silicone W-96 vulcanizate contained HiSil X303, a very fine silica. The mineral fillers in the Silastic S-2048 and Silastic LS-53 vulcanizates were not identified by the manufacturer of these stocks.

In the case of each stock compounded by this laboratory, the content of reinforcing filler was adjusted to yield a vulcanizate having a 15-second Shore A hardness of 70 ± 5. The hardness of Silastic S-2048 was 60 and that of Silastic LS-53 was 57. All of the vulcanizates including the two Silastics had compression sets of 40% or less after 70 hours at 212°F. when tested by ASTM D395-55, Method B. Thus, most of these vulcanizates had the hardness and resistance to hot compression set of a typical O-ring seal.

TABLE I—RUBBERS USED FOR PREPARING TEST SPECIMENS

Name	Type
Natural rubber	Isoprene polymer.
Synpol 1500	Styrene/butadiene copolymer (about 23% combined styrene) low-temperature polymerized.
Hycar 2001	Styrene/butadiene copolymer (higher combined styrene than Synpol 1500).
Hycar 1014	Acrylonitrile/butadiene copolymer (about 20% combined acrylonitrile).
Hycar 1041	Acrylonitrile/butadiene copolymer (about 40% combined acrylonitrile) low-temperature polymerized.
Philprene VP-25	2-Methyl-5-vinyl pyridine/butadiene polymer (about 25% pyridine derivative).
Neoprene WRT	Chloroprene polymer.
Viton A-HV	Vinylidene fluoride / hexafluoropropylene copolymer.
Gethane S	Polyurethane (iodine no. = 1).
Adiprene C	Polyurethane (iodine no. = 26).
Hycar 4021	Acrylic acid ester / halogen - containing-derivative polymer.
Silicone W-96	Methyl vinyl siloxane polymer.
Silicone 2048	Compounded methyl phenyl siloxane polymer (higher than normal phenyl content).
Silicone LS-53	Compounded fluorine-containing siloxane polymer.

TABLE II—RECIPES, CURES AND PROPERTIES OF VULCANIZATES

STOCK NO. 1

Smoked sheet	100.0
Philblack A[1]	65.0
Protox 166[2]	5.0
Stearic acid	1.0
Thionex[3]	0.8
Sulfur	3.0

Mold cure: 20 min. @ 290°F.

Tensile strength	2630 psi
Ultimate elongation	200%
Shore hardness	70
Hot compression set	31%

(1) Fast extrusion furnace black; (2) Zinc oxide with coating of zinc propionate; (3) Tetramethyl thiuram monosulfide.

STOCK NO. 2

Smoked sheet	100.0
Philblack A	65.0
Protox 166	5.0
Stearic acid	1.0
Thionex	0.8
Sulfur	3.0
Neozone D[1]	5.0

Mold cure: 20 min. @ 290°F.

Tensile strength	2720 psi
Ultimate elongation	260%
Shore hardness	68
Hot compression set	33%

(1) Phenyl-beta-naphthylamine.

STOCK NO. 3

Synpol 1500	100
Philblack A	55
Protox 166	5
Stearic acid	1
Thionex	2
Sulfur	1

Mold cure: 20 min. @ 300°F.

Tensile strength	2840 psi
Ultimate elongation	310%
Shore hardness	68
Hot compression set	24%

STOCK NO. 4

Synpol 1500	100
Philblack A	55
Protox 166	5
Stearic acid	1
Thionex	2
Sulfur	1
Neozone D	5

Mold cure: 20 min. @ 310°F.

Tensile strength	2390 psi
Ultimate elongation	280%
Shore hardness	65
Hot compression set	18%

STOCK NO. 5

Synpol 1500	100
Philblack A	50
Protox 166	5
Stearic acid	1
DiCup 40C[1]	4

Mold cure: 20 min. @ 310°F.

Tensile strength	2530 psi
Ultimate elongation	200%
Shore hardness	70
Hot compression set	30%

(1) Dicumyl peroxide 40%, inert filler 60%.

STOCK NO. 6

Hycar 2001	100.0
Philblack A	65.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8

Mold cure: 20 min. @ 310°F.

Tensile strength	2950 psi
Ultimate elongation	330%
Shore hardness	67
Hot compression set	29%

STOCK NO. 7

Hycar 2001	100.0
Philblack A	65.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Neozone D	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	2700 psi
Ultimate elongation	270
Shore hardness	65
Hot compression set	26%

STOCK NO. 8

Hycar 1014	100.0
Philblack A	65.0
Protox 166	5.0
Stearic acid	1.0
Thionex	1.0
Sulfur	0.8

Mold cure: 20 min. @ 310°F.

Tensile strength	2560 psi
Ultimate elongation	250%
Shore hardness	68
Hot compression set	32%

STOCK NO. 9

Hycar 1014	100.0
Philblack A	65.0
Protox 166	5.0
Stearic acid	1.0
Thionex	1.0
Sulfur	0.8
Neozone D	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	2400 psi
Ultimate elongation	300%
Shore hardness	65
Hot compression set	36%

STOCK NO. 10

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8

Mold cure: 20 min. @ 310°F.

Tensile strength	3450 psi
Ultimate elongation	320%
Shore hardness	70
Hot compression set	19%

TABLE II—RECIPES, CURES AND PROPERTIES OF VULCANIZATES *(Cont'd.)*

STOCK NO. 11

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Neozone D	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	3330 psi
Ultimate elongation	380%
Shore hardness	67
Hot compression set	21%

STOCK NO. 12

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Aranox[1]	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	3570 psi
Ultimate elongation	350%
Shore hardness	67
Hot compression set	25%

(1) p-(p-Tolylsulfonylamido)-diphenylamine.

STOCK NO. 13

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Santoflex GP[1]	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	3550 psi
Ultimate elongation	390%
Shore hardness	66
Hot compression set	21%

(1) N-cyclohexyl-N'-phenyl-p-phenylenediamine.

STOCK NO. 14

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
UOP 88[1]	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	3240 psi
Ultimate elongation	470%
Shore hardness	62
Hot compression set	26%

(1) N,N'-Bis (1-ethyl-3-methylpentyl) p-phenylene diamine.

STOCK NO. 15

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Stabilite Alba[1]	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	3660 psi
Ultimate elongation	380%
Shore hardness	67
Hot compression set	20%

(1) N,N'-Di-o-tolyl-ethylenediamine.

STOCK NO. 16

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Santoflex AW[1]	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	3260 psi
Ultimate elongation	410%
Shore hardness	66
Hot compression set	29%

(1) 6-Ethoxy-1, 2-dihydroxy-2,2,4-trimethylquinoline.

STOCK NO. 17

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Santowhite Crystals[1]	5.0

Mold cure: 20 min. @ 310°F.

Tensile strength	3760 psi
Ultimate elongation	380%
Shore hardness	65
Hot compression set	27%

(1) 4,4'-Thio-bis (6-tertiarybutyl-2-methyl phenol).

STOCK NO. 18

Hycar 1041	100.0
Philblack A	55.0
Protox 166	5.0
Stearic acid	1.0
Thionex	2.0
Sulfur	0.8
Antioxidant 2246[1]	5.0
Tensile strength	3620 psi

Mold cure: 20 min. @ 310°F.

Ultimate elongation	380%
Shore hardness	66
Hot compression set	25%

(1) 2,2'-Methylene-bis (4-methyl-6-tertiarybutyl phenol).

STOCK NO. 19

Hycar 1041	100
Philblack A	50
Protox 166	5
Stearic acid	1
DiCup 40-C	5

Mold cure: 20 min. @ 310°F.

Tensile strength	3630 psi
Ultimate elongation	360%
Shore hardness	67
Hot compression set	34%

TABLE II—RECIPES, CURES AND PROPERTIES OF VULCANIZATES *(Cont'd.)*

STOCK NO. 20

Philprene VP-25	100.0
Protox 166	5.0
Stearic acid	1.0
Ethyl Tuads[1]	2.5
Sulfasan R[2]	2.0
p-Xylene hexachloride	10.0

Mold cure: 45 min. @ 310°F.
Oven cure: 16 hr. @ 212°F.

Tensile strength	1460 psi
Ultimate elongation	180%
Shore hardness	75
Hot compression set	35%

(1) Tetraethyl thiuram disulfide; (2) Morpholine disulfide.

STOCK NO. 21

Neoprene WRT	100.0
Philblack A	45.0
Protox 166	5.0
Maglite D[1]	2.0
Stearic acid	0.5
NA-22[2]	0.5
Neozone A[3]	2.0

Mold cure: 30 min. @ 310°F.

Tensile strength	3660 psi
Ultimate elongation	250%
Shore hardness	72
Hot compression set	37%

(1) Special-processed, fine-particle magnesium oxide; (2) Ethylene thiourea; (3) Phenyl alpha naphthylamine.

STOCK NO. 22

Hycar 4021	100
Philblack A	50
Stearic acid	1
Triethylene tetramine	1

Mold cure: 30 min. @ 310°F.
Oven cure: 48 hr. @ 300°F.

Tensile strength	1500 psi
Ultimate elongation	290%
Shore hardness	69
Hot compression set	8%

STOCK NO. 23

Adiprene C	100.0
Philblack A	20.0
Stearic acid	0.2
DiCup 40-C	8.5

Mold cure: 45 min. @ 310°F.

Tensile strength	1380 psi
Ultimate elongation	120%
Shore hardness	72
Hot compression set	33%

STOCK NO. 24

Genthane S	100.0
Philblack A	35.0
Stearic acid	0.2
DiCup 40-C	9.0

Mold cure: 45 min. @ 310°F.

Tensile strength	4520 psi
Ultimate elongation	280%
Shore hardness	69
Hot compression set	27%

STOCK NO. 25

Viton A-HV	100
Thermax[1]	40
Protox 166	10
Dyphos[2]	10
HMDA Carbamate[3]	1

Mold cure: 30 min. @ 275°F.
Oven cure: 1 hr. @ 200°F.
1 hr. @ 250°F.
1 hr. @ 300°F.
1 hr. @ 350°F.
24 hr. @ 400°F.

Tensile strength	1690 psi
Ultimate elongation	150%
Shore hardness	73
Hot compression set	15%

(1) Medium thermal black; (2) Dibasic lead phosphite; (3) Hexamethylenediamine carbamate.

STOCK NO. 26

Silicone W-96	100.0
HiSil X303[1]	40.0
Ditertiary butyl peroxide	0.8

Mold cure: 30 min. @ 340°F.
Oven cure: 24 hr. @ 480°F.

Tensile strength	850 psi
Ultimate elongation	250%
Shore hardness	67
Hot compression set	21%

(1) Hydrated silica of extremely fine particle size.

STOCK NO. 27

Silastic S-2048	No recipe (compounded by manufacturer)

Mold cure: 15 min. @ 240°F.
Oven cure: 1 hr. @ 300°F.
1 hr. @ 350°F.
1 hr. @ 400°F.
4 hr @ 480°F.

Tensile strength	800 psi
Ultimate elongation	280%
Shore hardness	60
Hot compression set	40%

STOCK NO. 28

Silastic LS-53	No recipe (compounded by manufacturer)

Mold cure: 5 min. @ 260°F.
Oven cure: 24 hr. @ 300°F.

Tensile strength	1010 psi
Ultimate elongation	190%
Shore hardness	57
Hot compression set	11%

Testing Procedure

The vulcanizates were exposed to gamma radiation in the form of compressed cylindrical specimens. The specimens, originally 0.75-inch in diameter and 0.50-inch thick, were held compressed during exposure to a thickness of 0.35-inch (30% compression). Three replicate specimens of each vulcanizate were subjected to each of the conditions to be described later.

The specimens were held in special containers during exposure to gamma radiation. One of these devices is shown in Figure 1. It consisted of a stack of eight square plates made from 6l-S aluminum, held together by five aluminum tie rods (aluminum is

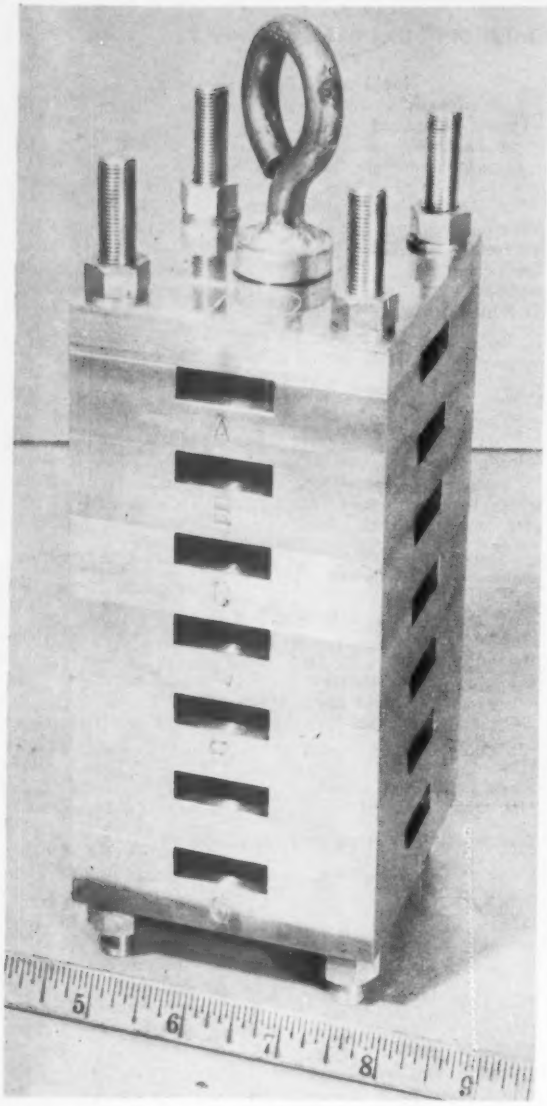

FIG. 1—Assembled aluminum container used for exposing compressed rubber specimens to gamma radiation.

essentially transparent to gamma radiation). Rubber specimens were clamped between each pair of plates in the stack. The top plate was plane on both faces. The other plates were plane on their bottom face, but were milled out on their top face, as shown in Figure 2, to provide a flat bearing surface for the specimens as well as shoulders for limiting the compression of the specimens. The aluminum surfaces in contact with the specimens had a roughness not greater than 63 microinches.

The arrangement of the specimens on each plate of the containers is shown in Figure 3. Each container held 42 specimens distributed between seven levels. The locations of the three replicate specimens of each vulcanizate, which were being subjected to

TABLE III—RADIATION HISTORY OF COMPRESSED RUBBER SPECIMENS IN ALUMINUM CONTAINERS

(All containers immersed in water-filled canal for 208.25 hours.)

Container No.	Exposure (hours)	Average Dose Rate (roentgens/hour)	Total Dose (roentgens)
1	2.83	3.54×10^6	1.00×10^7
2	2.75	3.637×10^6	1.00×10^7
3	27.12	3.688×10^6	1.00×10^8
4	24.07	4.155×10^6	1.00×10^8
5	208.25	4.802×10^6	1.00×10^9
6	200.25	4.986×10^6	1.00×10^9
7 (control)	0	0	0
8 (control)	0	0	0

the same test conditions, were randomized between two containers and the seven levels of each container. The purpose of the random arrangement was to reduce the error in the averaged test results in the event that intensity of gamma radiation was non-uniform.

The loaded containers were sent to the Atomic Energy Division of the Phillips Petroleum Co. at Idaho Falls, Idaho. Containers holding three specimens of each vulcanizate which was sent for irradiation were retained at the laboratory in a room maintained at $73.5 \pm 2°F$. These specimens served as air-exposed controls.

The exposure to gamma radiation was carried out in the water columns shown in Figures 4 and 5. The canal in which the water columns stood had a water depth of 15½ feet down to the fuel element grid plate. The water columns were closed at the bottom, but had a demineralized water line injecting clean water into the lower part of the columns which overflowed at the top and thus purged the columns con-

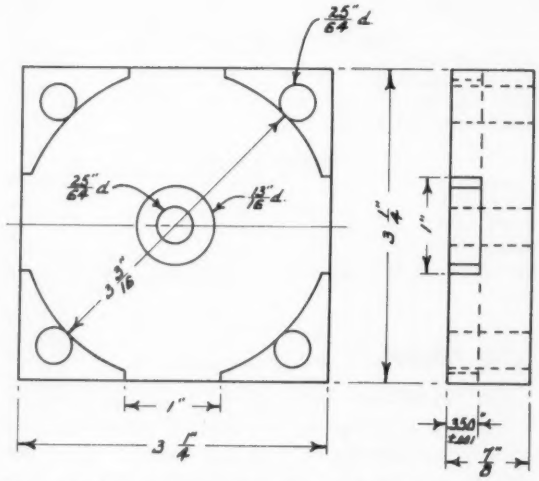

FIG. 2—Schematic drawing of one plate of the aluminum container.

tinuously. The water temperature was about 75°F. The containers were raised to the upper end of the water columns when it was desired to remove them from the field of radiation but keep them in the water. This was done when replicate specimens were being exposed to different dosages of gamma radiation, and it was desired to leave all of them in water for the same period.

Containers holding three specimens of each vulcanizate were immersed in the water but kept out of the radiation field. These specimens served as water-exposed controls.

The radiation history of the containers which were sent to Idaho Falls is given in Table III.

When the containers were returned from Idaho Falls, all specimens, including the air-exposed and water-exposed controls, were released at the same time. The specimens were let stand for 24 hours at 73.5 ± 2°F. and then measured for thickness.

An indentation reading was obtained on each specimen by means of a Mast Indentometer, Model 650-2. Since most of the specimens were somewhat cupped, they were supported on a ¼-inch diameter flat pedestal centered under the indentor while taking the reading. The critical features of this test, namely, 0.125-inch diameter hemispherical indentor, 1000-gram weight resting on the indentor for exactly a one minute reading, and the indentation expressed in hundredths of a millimeter, were the same as those used for the ASTM test with the Pusey and Jones Plastometer (D531-56). The higher the reading on the Mast Indentometer, the softer was the stock. The Mast Indentometer measured hardness (inversely) more precisely than did the Shore durometer.

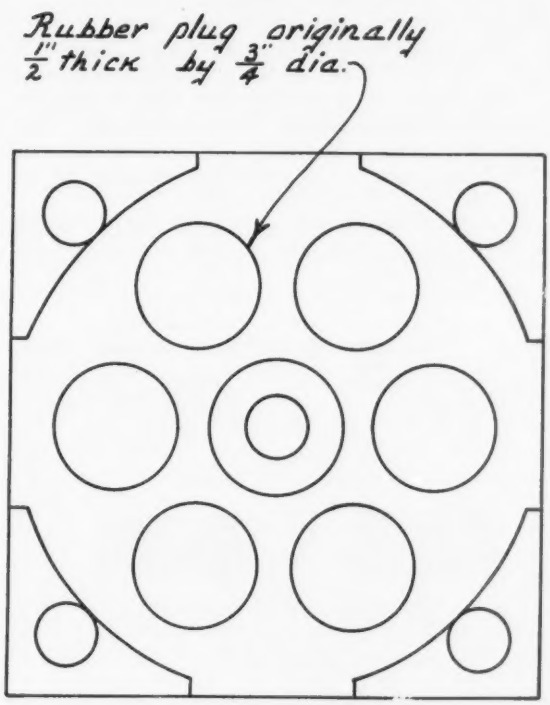

FIG. 3—Layout of specimens on each milled plate of the aluminum container.

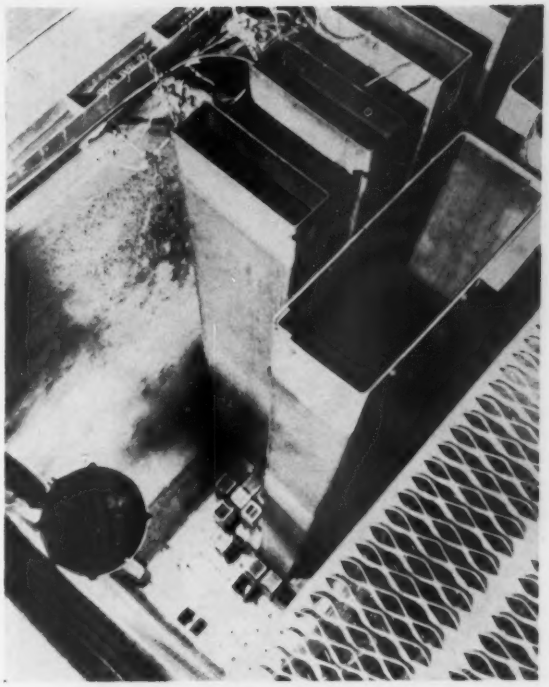

FIG. 4—MTR fuel elements positioned around various water columns in the canal.

Since some of the specimens showed poor recovery from compression even though they had not been exposed to radiation, all of the specimens were placed in an oven for four hours at 212°F., cooled on a wooden surface for 30 minutes, then again measured for height. This treatment was for the purpose of overcoming the effect of high internal viscosity and thereby hastening any recovery in height which would eventually occur.

The compression set values, before and after the oven treatment, were calculated using the following equation:

$$\text{Per cent compression set} = \frac{T_o - T_r}{T_o - T_c} \times 100$$

where T_o = specimen thickness before compression,
T_c = specimen thickness when compressed, and
T_r = specimen thickness after recovery.

Results of Tests

The effects of irradiation on the specimens are shown in Table IV and summarized below.

(1) Most of the specimens had compression sets less than 50% after a dosage of 10^7 roentgens. The highest sets after this dosage approximated 90% Silicone W-96 and Silastic LS-53).

(2) There was considerable variation between the sets after exposure to 10^8 roentgens. They ranged from about 60% to over 100%. The specimens having about 60% set were Synpol 1500 cured with

FIG. 5—Aluminum containers being held directly above the positions they occupied in the water columns.

sulfur and containing Neozone D, Synpol 1500 cured with DiCup 40C, and Adiprene C cured with DiCup 40C.

(3) All of the specimens had 96 to 100% set after exposure to 10^9 roentgens. Some had more than 100% set due to shrinkage from resinification. Figure 6 shows the difference in thickness of specimens of the same vulcanizate after receiving various amounts of radiation.

(4) Five parts of an antioxidant in the specimens prepared from natural rubber and the butadiene copolymers invariably reduced somewhat the set after radiating with 10^7 or 10^8 roentgens. There was a difference in the effectiveness of the various antioxidants tried in Hycar 1041. Aranox was the best.

(5) Synpol 1500 cured with DiCup 40C had less set after treatment with 10^7 or 10^8 roentgens than Synpol 1500 cured with sulfur. In contrast, Hycar 1041 cured with DiCup 40C had more set than the corresponding sulfur-cured stock.

(6) Hycar 2001 had a greater set than Synpol 1500 even though it contained more styrene in its molecule than Synpol 1500. The presence of benzene rings in a polymer is usually considered to confer improved resistance to nuclear radiation because the resonant structure of these rings provides an "energy sink".

(7) The poorest resistance to radiation-induced compression set was exhibited by Viton A-HV, Silicone W-96, Silastic S-2048 and Silastic LS-53.

(8) The hardnesses of all specimens except Genthane S were increased (indentation decreased) by each increment of radiation. Many actually became brittle. Genthane S was found to be softened after dosages of 10^7 and 10^8 roentgens and to be hardened only a moderate amount after a dosage of 10^9 roentgens. Among the specimens which were invariably hardened, a dosage of 10^7 roentgens caused only a small or moderate change except in the cases of Silicone W-96 and Silastic S-2048, which were seriously affected. Adiprene C was the least affected by 10^8 roentgens. The softest specimens after 10^9 roentgens were smoked sheet containing Neozone D, Hycar 4021, Adiprene C and, particularly, Genthane S.

Some additional interesting information gathered in the course of the experiments was the following:

(1) There was good agreement between the sets of the air-exposed controls and those of the water-immersed controls. Evidently, immersion in water for 208 hours had no effect on this property of the vulcanizates.

(2) The Viton A-HV, Silicone W-96 and Silastic S-2048 specimens which had not been irradiated had

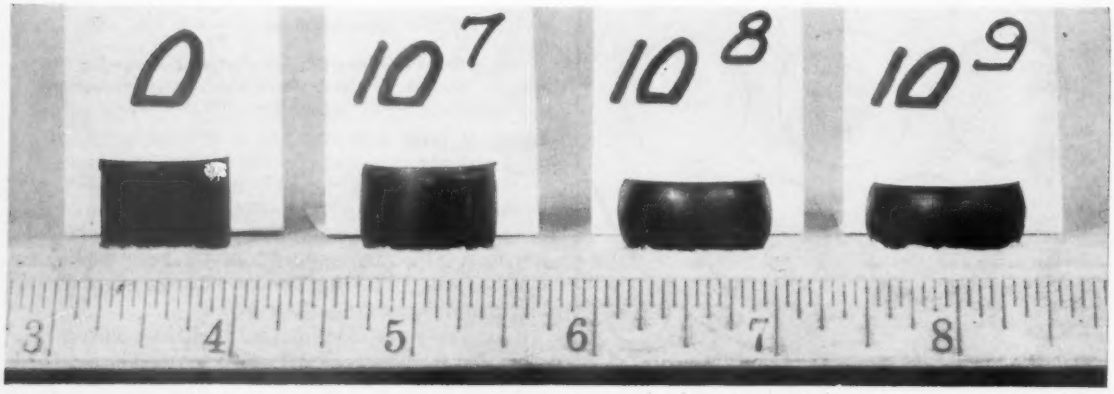

FIG. 6—Appearance of specimens of same vu'canizate after different dosages (roentgens) of radiation while compressed 30% during exposure.

TABLE IV—COMPRESSION SETS AND INDENTATION VALUES

Stock No.	Description of Vulcanizates: Rubber	Vulcanizing Agent	Antioxidant	Compression Sets, (%), After Indicated Treatment: Control air exposed RT[1]	Control air exposed O[2]	Control water exposed RT	Control water exposed O	Exposed to 10^5R RT	Exposed to 10^5R O	Exposed to 10^6R RT	Exposed to 10^6R O	Exposed to 10^9R RT	Exposed to 10^9R O	Mast Indentation Value After Indicated Treatment: Control	Exposed to 10^7R	Exposed to 10^8R	Exposed to 10^9R
1	Smoked sheet	Sulfur	None	7	3	6	2	30	20	84	80	99	99	72	65	39	11
2	Smoked sheet	Sulfur	Neozone D	6	2	6	2	27	18	79	73	98	97	80	79	50	20
3	Synpol 1500	Sulfur	None	3	1	3	1	26	21	78	75	100	99	84	76	43	2
4	Synpol 1500	Sulfur	Neozone D	3	1	3	1	15	12	64	60	98	97	89	87	60	12
5	Synpol 1500	DiCup 40C	None	3	0	3	1	13	10	63	59	99	98	77	74	48	2
6	Hycar 2001	Sulfur	None	5	0	6	0	38	32	84	81	99	98	91	80	40	2
7	Hycar 2001	Sulfur	Neozone D	5	1	4	1	26	22	77	73	98	96	93	86	52	6
8	Hycar 1014	Sulfur	None	8	2	7	2	47	40	92	90	100	100	86	69	25	2
9	Hycar 1014	Sulfur	Neozone D	8	2	7	1	39	32	87	85	100	100	95	85	42	2
10	Hycar 1041	Sulfur	None	5	1	5	1	29	24	84	81	100	99	81	71	32	1
11	Hycar 1041	Sulfur	Neozone D	4	0	4	1	24	17	76	72	100	98	86	82	50	2
12	Hycar 1041	Sulfur	Aronox	5	1	6	1	21	15	74	69	99	98	86	81	51	2
13	Hycar 1041	Sulfur	Santoflex GP	5	0	5	1	21	15	76	71	99	98	82	81	51	1
14	Hycar 1041	Sulfur	UOP-88	5	0	5	0	25	18	79	75	100	99	93	87	51	1
15	Hycar 1041	Sulfur	Stabilite Alba	5	1	5	1	26	20	81	77	100	98	86	80	42	1
16	Hycar 1041	Sulfur	Santoflex AW	7	1	7	1	28	19	80	76	99	98	90	86	47	2
17	Hycar 1041	Sulfur	Santowhite Crystals	5	1	6	1	29	23	81	78	99	99	87	81	43	2
18	Hycar 1041	Sulfur	Antioxidant 2246	5	1	6	1	26	20	80	76	100	98	91	85	46	2
19	Hycar 1041	DiCup 40C	None	11	2	10	2	58	51	92	91	100	100	108	82	31	2
20	Philprene VP-25	Ethyl Tuads Sulfasan R p-Xylene hexachloride	None	16	0	16	0	28	13	90	77	99	98	74	64	12	2
21	Neoprene WRT	Protox 166 Maglite D NA-22	Neozone A	5	2	5	2	36	30	88	84	99	97	69	57	21	1
22	Hycar 4021	Triethylene tetramine	None	4	0	3	1	45	41	90	90	99	99	111	96	48	28
23	Adiprene C	DiCup 40C	None	6	3	4	3	17	14	59	58	101	102	66	65	54	29
24	Genthane S	DiCup 40C	None	2	1	3	2	18	15	82	81	101	101	77	82	103	62
25	Viton A-HV	HMDA Carbamate	None	38	1	46	0	83	71	100	100	104	102	67	60	23	2
26	Silicone W96	Ditertiary butyl peroxide	None	36	26	30	27	93	92	98	98	103	102	207	60	22	5
27	Silastic S2048	Not known	None	44	34	45	38	89	88	97	97	101	101	204	80	30	9
28	Silastic LS-53	Not known	None	7	4	7	5	68	65	104	103	107	108	146	133	49	15

(1) Compression set after recovery period of 24 hours at room temperature (73.5°F.); (2) Compression set after additional recovery period of four hours in oven at 212°F.

high sets after being compressed for 29 days and allowed to recover at room temperature for one day. An additional 11 days at room temperature followed by heating in an oven to 212°F. for four hours caused the Viton A-HV specimens to lose almost all of their set. This proved that the original high values for this vulcanizate were caused by internal viscosity, not by stress relaxation or cross-linking. The sets of the silicone rubbers remained high after this treatment.

(3) The additional 11 days standing plus oven treatment reduced somewhat the sets of all of the various rubber specimens, whether they had been irradiated or not. The original 24-hour recovery period at room temperature was not long enough for all of the elastic recovery of these vulcanizates to be consummated.

(4) Irradiation caused the Philprene VP-25, Viton A-HV and Silastic LS-53 specimens to corrode the aluminum plates against which they pressed. Aluminum plates corroded by the first two vulcanizates are shown in Figure 7. Apparently the intense gamma radiation caused halogen acids to be liberated from these vulcanizates. Analysis of the pinkish white residue found under a Viton A-HV specimen showed it to be a fluoride.

Permanent compression set of fully vulcanized rubber is believed to be caused by one or two chemical reactions: (1) breaking of primary valence bonds in stressed polymer chains or in cross-links between the chains with consequent flow of the residues to positions of lower stress, and (2) formation of new cross-links between stressed polymer chains or chain residues which tend to hold them in their new positions. Both of these molecular phenomena also affect the mechanical stiffness of the rubber; the first tends to soften it and the second tends to harden it.

The hardness of all of the vulcanizates included in this investigation, except Genthane S, were consistently increased by exposure to radiation. Thus it appears that the compression sets of these rubbers were largely due to cross-linking engendered by gamma radiation. Genthane S apparently experienced considerable breakage of primary valence bonds in the earlier stages of irradiation.

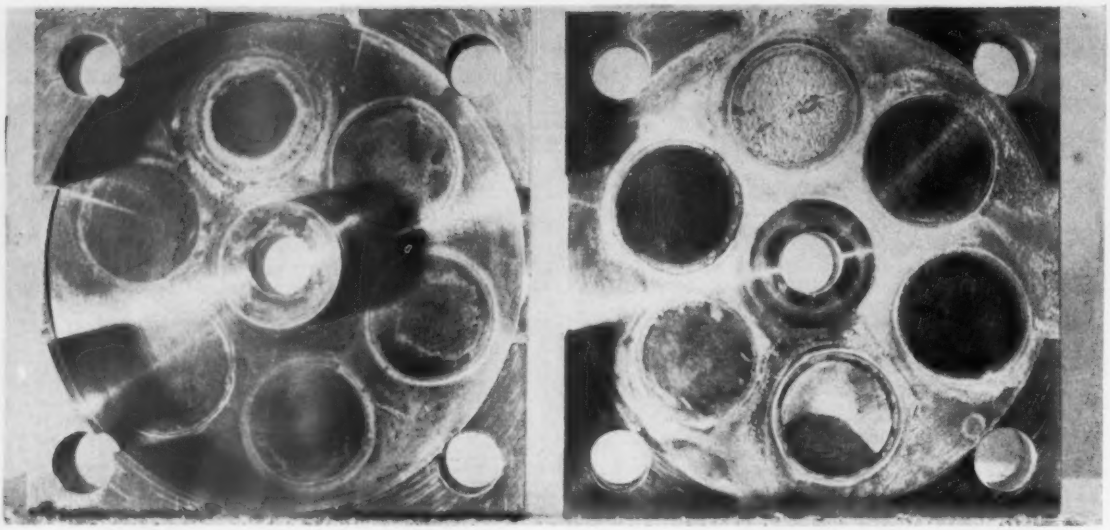

FIG. 7—Aluminum plates showing corrosion caused by Philprene VP-25 specimen (top circular area on left plate) and Viton A-HV specimen (top right plate) during irradiation.

Conclusion

The information obtained in this investigation shows that none of the rubbers tested, when compounded with the usual ingredients, will yield gaskets or seals capable of performing satisfactorily after being irradiated with 10^9 roentgens of gamma rays. For lower dosages of radiation, satisfactory gaskets and seals can be made from several rubbers, but best results would be obtained by using properly compounded styrene rubber, acrylonitrile-butadiene rubber, or a specific polyurethane rubber (Adiprene C).

ACKNOWLEDGMENT

The authors wish to express their appreciation to F. L. McMillan and D. L. Hunke of the Phillips Petroleum Co., Atomic Energy Division, for their assistance in designing the compression device and for carrying out the irradiation of the specimens.

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Cleaning Tire Molds

A NEW wet blast unit, designed especially for the elimination of hand cleaning in the maintenance of tire molds, was recently delivered to Pirelli, S.p.A., Milan, Italy. The equipment was designed and manufactured by the Pressure Blast Mfg. Co., Inc., Manchester, Conn. Prior to installation of the unit, molds were removed from the press, chemically soaked and hand finished. Now molds are taken directly to the wet blast unit without prior treatment and cleaned to basic metal in approximately one-third the former time. The cleaning medium is a fine mesh abrasive, which is suspended on water and impelled by compressed air.

The blast cabinet portion of the unit, which measures 70 inches wide by 70 inches deep by 104 inches high, is designed to accommodate molds 60 inches in diameter and 8 inches thick. Large counterweighted doors are positioned at either end and manual blasting is conducted by a single operator who stands outside the unit and uses any two of three arm-parts. To the left of the blast cabinet is a combination loading device and rinse stand 80 inches long and 70 inches wide. Molds are lowered on a circular 60-inch diameter rotary table, manually pushed into the blast cabinet and finished. Upon completion, the carriage mounted table is rolled back out over the rinse stand and water-flushed for the removal of residual abrasive.

Laboratory Processing Properties of two synthetic polymers

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Goodyear Tire & Rubber Co., Akron, Ohio

Times required for incorporation and equivalent states of dispersion of reinforcing furnace blacks in styrene and acrylonitrile-butadiene rubbers can be accurately measured from laboratory Banbury power consumption curves. These curves are typical and reproducible for the various types of styrene and acrylonitrile-butadiene rubbers, and they are sensitive enough to distinguish minor differences in black pigment incorporation times between various lots of a specific type of rubber.

THE PRESENT trend toward shorter Banbury mixing cycles has resulted in the need for a more critical appraisal of the Banbury mixing properties of synthetic rubbers. Mooney viscosities have been used as indicators of processing properties of synthetic rubbers with only partial success because polymerization variables such as per cent conversion may invalidate the Mooney viscosity-processibility relationship. Furthermore, specific types of synthetic rubbers having comparable Mooney viscosities vary widely in their mixing properties. Visual observations on Banbury mixing properties of specific types of synthetic rubbers have only been valid enough to classify them into easy or poor processing types.

Jones and Snyder *(1, 2)* utilized laboratory Banbury power curves in mixing studies conducted on various zinc oxides and rubber. Gale, Harris, and Kilbank *(3)* have reported an empirical test for rating factory processing properties of oil-extended styrene rubbers. This test was based upon the changes in power consumption obtained during laboratory Banbury mixing of an HAF reinforced compound containing the rubber to be evaluated. Using the latter work as a basis, extensive studies were made in this laboratory on power curves obtained during laboratory Banbury mixing of reinforcing furnace black-styrene rubber and acrylonitrile-butadiene rubber blends. Based upon our work, we believe that Banbury power consumption curves:

(1) Accurately measure the rate at which acrylonitrile-butadiene and styrene rubbers incorporate pigment during Banbury mixing as well as detect minor differences in Banbury processing properties within each specific type.

(2) Will lead to a better understanding and evaluation of the processing properties of synthetic rubbers.

(3) Can be used as a simple quality control test at the polymer plants to assist in maintaining uniformity in processing properties of the synthetic rubbers which they manufacture.

In the data to be presented, power consumption curves obtained during laboratory Banbury mixing of reinforcing carbon black pigments with rubber were used to:

(1) Compare Banbury mixing characteristics of representative types of styrene and acrylonitrile-butadiene rubbers.

(2) Compare the effects of various rotor speeds, ram pressures, and batch sizes on rate of pigment incorporation by an oil-extended styrene rubber.

(3) Compare rates of mixing of various carbon black pigments in an oil-extended styrene rubber.

(4) Illustrate use of the power curve as an aid in evaluating effects of polymerization variables on Banbury processing properties of a rubber.

Experimental Procedure

Table I contains recipes used in the evaluations. This laboratory has utilized this type of formulation for measuring processibility of styrene and acrylonitrile-butadiene rubbers as well as vulcanizate properties. Zinc oxide and stearic acid have been included in the recipes to permit their use as non-productives from which vulcanizate properties could be obtained. Recipe A was used for all polymer comparisons, and this compound occupied approximately 47.5 per cent of the free Banbury chamber capacity. Recipes B, C, and D were used where noted.

Mixing studies were made in a variable speed laboratory size 00 Banbury having a chamber volume of 263 in^3. or 4300 cc. Clearance between rotors and shell was 1/16-inch. Diameter of the ram piston was 5 inches, and cross sectional area of the ram was 24 in^2. An Esterline Angus graphic wattmeter with a full scale reading of 50 kw recorded the power consumed by the rubber-pigment mixes on a chart traveling at a

Note: This paper was presented before the Division of Rubber Chemistry, ACS, at Chicago, Illinois, September 11, 1958.

TABLE I—RECIPES OF STOCKS USED IN STUDY

	Grams
Recipe A	
Polymer	1500
Zinc oxide	45
Stearic acid	15
HAF black	750
	2310
Recipe B	
Type 1712 styrene rubber	100
Zinc oxide	3
Stearic acid	1
HAF black	50
	Variable
Recipe C	
Type 1712 styrene rubber	1500
Zinc oxide	45
Stearic acid	15
HAF black	750
	2310
Recipe D	
Type 1712 styrene rubber	1500
Zinc oxide	45
Stearic acid	15
Carbon black	750
	2310

speed of ¾-inch per minute. Stock temperatures were autographically recorded from a thermo-couple projecting through the face of the ram into the mixing chamber.

Cooling water was circulated through rotors and shell. Unless otherwise indicated, the Banbury rotor speed was 80 rpm, and pressure on the cross-sectional area of the ram was 50 psi. The rubber was charged to the Banbury and masticated for one minute, after which zinc oxide, stearic acid, and black pigment were added. After lowering of the ram on the rubber-pigment mixture, batches were mixed until the second maximum in the Banbury power curve had been past.

Interpretation of Banbury Power Cure

Reproduction of a power curve obtained during laboratory Banbury mixing of Recipe C is shown in Figure 1. Rotor speed was 80 rpm and ram pressure was 50 psi. This power curve is representative of those obtained during mixing of other styrene rubber-HAF black mixes. However, power peaks may be more or less pronounced, and time between the power peaks may also vary widely.

The power curve in Figure 1 reads from right to left. The abscissa was time of mixing in minutes, and the ordinate was power consumed in kilowatts. Interval AB was a one minute mastication time on type 1712 styrene rubber. The ram was raised at B. Zinc oxide, stearic acid, and HAF black were added during interval BC. After lowering of the ram on the rubber pigment mixture at C, power requirements gradually rose to a maximum at D, diminished to a minimum at E, and again rose to a second maximum at F. After

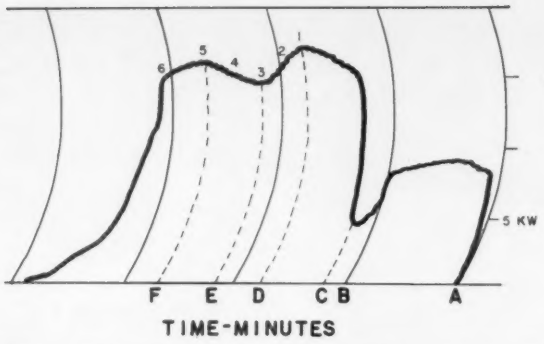

FIG. 1—Banbury power curve of laboratory mixing of Recipe C styrene rubber (AB = 1 minute).

passing the second maximum, power requirements fell off in an almost linear manner.

Six batches were mixed to points 1, 2, 3, 4, 5, and 6 marked along the power curve in Figure 1 to illustrate changes in character of the rubber-pigment blend with changes in power consumption. Batches dropped prior to batch 1 had a sandy consistency, and loose black was present throughout the mixture. Batches 1 and 2 consisted of tough, dull, grainy masses of the rubber-black pigment mixture. The rubber phase was discontinuous within these masses as evidenced by their boardy non-plastic character. Batch 2 consisted of smaller masses than batch 1 due to an apparent disintegration of the larger masses present in batch 1.

Batch 3 was made up of small discrete lumps that were developing a nervy or rubbery consistency. Batch 4 was still made up of discrete lumps, however they were more rubbery than those in batch 3. Batch 5 had come together into a continuous mass, cut surfaces of which were developing a shiny appearance. At this point, the rubber had become the continuous phase. Batch 6 was similar to batch 5 except for a smoother texture.

Mooney viscosities, ML-4 —212°F., on batches 1 through 6 were 109.5, 107.5, 100, 95, 87.5, and 72 respectively. The appearance of these batches offered an explanation for the changes in power consumption obtained during mixing of the compound. After addition of the black pigment, rotor shear shredded the

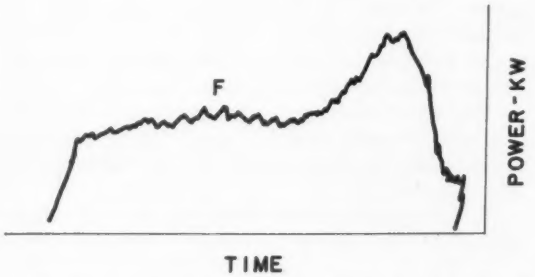

FIG. 2—Power curve of mixing of a reinforcing furnace black-oil extended styrene tread rubber compound in a number 11 Banbury.

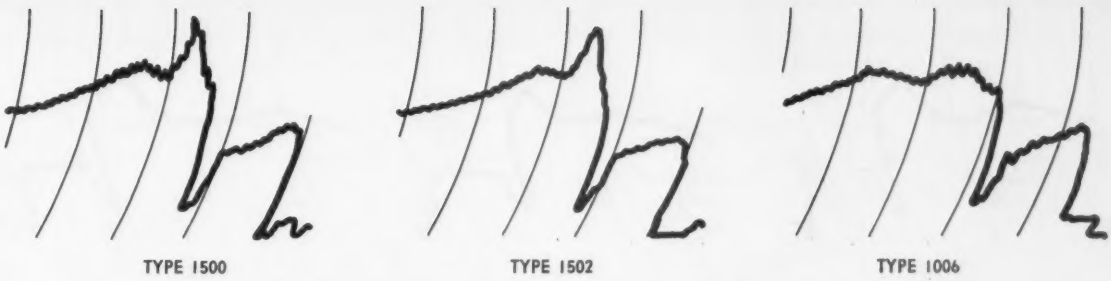

FIG. 3—Banbury power curves of types 1500, 1502 and 1006 styrene rubbers.

continuous rubber mass into small particles which remained partitioned by the black pigment.

Continued shear smeared the black pigment into the rubber particles which were able to cohere to each other when the loose black had disappeared. This corresponded to the first maximum in the power curve. The batch then disintegrated into smaller masses as the black agglomerates were reduced, and this required less power. As the rubber gradually became the continuous phase, interval EF, increasing power was required to point F where the rubber became the continuous phase. After point F, power requirements fell off in an almost linear manner due to a continued reduction in Mooney viscosity of the mixed compound.

The second maximum in the laboratory Banbury power curve has corresponded to visibly equivalent mixes for the various types of styrene and acrylonitrile-butadiene rubbers in recipe A. Extensive testing has shown this point in the power curve to be reproducible within ± 0.1 of a minute when a specific sample of styrene rubber is repeatedly mixed in the same laboratory Banbury under identical mixing conditions.

Limited factory processing data have indicated that the second maximum in the laboratory Banbury power curve is a reliable measure of the Banbury mixing characteristics of styrene rubbers. The time to reach this point will be referred to as the black incorporation time. Black incorporation times were measured directly from the power curves as the time interval CF which corresponded to the time between lowering of the ram on the rubber pigment mixtures at C and the second maximum in the power curves.

Laboratory observations indicate that specific types of styrene rubbers having variable black incorporation times will have similar milling, tubing, and die swell characteristics if mixed to the second maximum in the power curve. Differences in mixing characteristics exist between different laboratory Banburies of the same size. Attempts to obtain identical black incorporation times between three different size 00 laboratory Banburies have not been successful. However, black incorporation times between these laboratory Banburies were found to be relative to each other.

Typical power consumption curves having the described characteristic maxima and minimum points have been obtained during mixing of a reinforcing furnace black and styrene rubber in a production Banbury. The power curve in Figure 2 was obtained during mixing of a reinforcing furnace black-oil extended styrene tread rubber compound in a number 11 Banbury. Point F corresponds to the second maximum in the power curve, and a mixing time of 5.5 minutes was required to reach this point. Changes in character of the same compound run to various points along the power curve in the number 11 Banbury correlated with changes occurring in a black rubber mix along the power curve in a laboratory Banbury.

Heat build-up during mixing of reinforcing black-rubber compounds in production Banburies often prohibit mixing to the second maximum in the power curve. If appreciable variations occur in a specific type of rubber, resultant production batches using this rubber in a given time cycle mix will be mixed to variable points before the second maximum in the power curve. These batches will have variable processing properties through subsequent processing steps.

TABLE II—BLACK INCORPORATION TIMES FOR STYRENE RUBBERS

Recipe A
Ram pressure, 50 psi; rotor speed, 80 rpm

Type Styrene Rubber	Black Incorporation Time (min.)	M/L-4'-212°F. Compound
1006	1.9	71
1500	1.1	91
1502	1.1	90
1712	1.5	62
1773	2.1	66
1778	2.6	64

Mixing Properties of Styrene Rubbers

Types 1006, 1500, 1502, 1712, 1773, and 1778 styrene rubbers were selected as representative of hot, cold, and oil-extended rubbers. Banbury black incorporation times obtained on these rubbers in recipe A are given in Table II. These black incorporation times are not necessarily average for the specific kinds of styrene rubbers which they represent. However, they illustrate differences in their Banbury mixing characteristics.

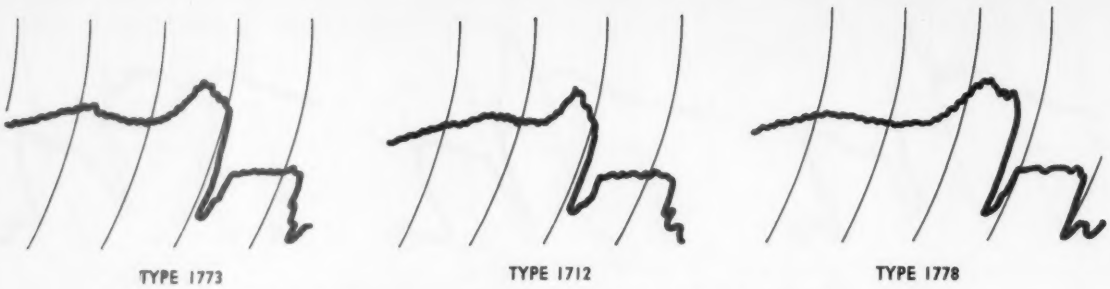

FIG. 4—Banbury power curves of types 1773, 1712 and 1778 styrene rubbers.

Black incorporation times showed the cold styrene rubbers to have excellent Banbury mixing properties as compared to the hot and oil-extended rubbers. Type 1712, extended with a highly aromatic oil, had much better Banbury mixing properties than the 1773 and 1778 styrene rubbers which were extended with naphthenic type oils. These black incorporation times correlate with known mixing properties of each type. Figures 3 and 4 show Banbury power curves from which data in Table II were taken. The hot, cold, and oil-extended styrene rubbers produced power curves characteristic of the types of styrene rubbers which they represented.

Acrylonitrile-Butadiene Rubbers

Banbury power curves show differences in mixing behavior between the various classes of acrylonitrile-butadiene rubbers and differences that may be present in any one type. Using recipe A, laboratory Banbury power curves were obtained on medium and high acrylonitrile rubbers of this type polymerized at 120°F., and a medium acrylonitrile rubber polymerized at 41°F. Banbury black incorporation times are listed in Table III.

The high acrylonitrile hot rubber had better Banbury mixing properties than the medium acrylonitrile hot rubbers. An increase in Mooney viscosity of 33 points in the medium acrylonitrile hot rubbers greatly increased black incorporation time. The cold medium acrylonitrile rubber had improved Banbury processing properties over the low Mooney hot medium acrylonitrile rubber. These differences closely correlate with observations that have been made on equivalent type acrylonitrile-butadiene rubbers through varied factory processing operations.

Banbury power curves from which data in Table III were taken are shown in Figure 5. A comparison of these power curves with those in Figure 4 show close resemblances between the respective hot and cold acrylonitrile-butadiene and styrene rubbers.

Banbury Variables and Black Incorporation Time

Laboratory Banbury power curves were used to evaluate the effects of rotor speed, batch size, and ram pressure on the rate of black incorporation by styrene rubber. The second maximum in the power curve corresponded to an equivalent state of mixing so the time of mixing required to reach this point provided a quantitative basis for evaluation of Banbury variables on speed of mixing.

Effect of Batch Size. Recipe B was varied in volume, Table IV, to evaluate the effect of batch size on Banbury black incorporation times at a constant ram pressure of 50 psi and a constant rotor speed of 80 rpm. Increasing the batch size from 41 to 57 per cent of the free chamber volume did not change black incorporation times (Table IV). Ram pressures of 50 psi were sufficient to contain each of the batches in the chamber. A differential in temperature of 100°F. was obtained between the smallest and largest batch during the mixing cycle.

Effect of Rotor Speed. Recipe C was used to evaluate the effect of rotor speed at a constant ram pressure of 50 psi on black incorporation times. Rotor

TABLE III—BLACK INCORPORATION TIMES FOR ACRYLONITRILE-BUTADIENE RUBBERS

Recipe A
Ram pressure, 50 psi; rotor speed, 80 rpm

Acrylonitrile-Butadiene Rubber	Type	M/L-4'-212°F. Polymer	Black Incorporation Time (min.)
Medium AN	Hot	56	2.0
Medium AN	Hot	89	3.2
High AN	Hot	100	2.3
Medium AN	Cold	48	1.3

TABLE IV—EFFECT OF BATCH SIZE ON BLACK INCORPORATION TIMES

Recipe B
Ram pressure, 50 psi; rotor speed, 80 rpm

% of Chamber Capacity	Black Incorporation Time (min.)	Discharge, °F.
41	1.5	190
44	1.4	225
47	1.5	235
50	1.5	252
53	1.5	278
57	1.5	288

TABLE V—EFFECT OF ROTOR SPEED ON BLACK INCORPORATION TIME

Recipe C
Ram pressure, 50 psi; rotor speed, variable

Rotor-Speed (rpm)	Black Incorporation Time (min.)	Discharge, °F.
40	3.60	168
50	2.50	200
60	2.10	213
70	1.70	220
80	1.50	236
90	1.35	242
100	1.20	250
110	1.00	260

TABLE VI—EFFECT OF RAM PRESSURE ON BLACK INCORPORATION TIME

Recipe B
Ram pressure, variable; rotor speed, 80 rpm

Ram Pressure (psi)	Black Incorporation Time (min.) 47% Chamber Capacity	60% Chamber Capacity
20	2.0	4.6
30	1.7	1.8
40	1.6	1.7
50	1.5	1.6
60	1.5	1.5
70	1.5	1.5
75	1.5	1.5

speeds were increased from 40 to 110 rpm in 10 rpm increments, Table V. At 40 rpm, very long and indistinct power peaks were obtained. Rotor speeds were found to have a pronounced effect on the rate at which the HAF black was incorporated by the type 1712 styrene rubber. A plot of rotor speeds between 50 and 110 rpm versus log of the black incorporation time, Figure 6, produced a straight line. This unexpected logarithmic relationship dramatically illustrates the savings in mixing cycle times to be gained by using high speed, high pressure Banbury mixers.

Effect of Ram Pressure. Ram pressures were varied between 20 and 75 psi using a volume of recipe B that occupied 47 and 60 per cent of the free Banbury chamber volume. When enough ram pressure was applied to seat the ram, further increases in ram pressure did not reduce the time required to incorporate the black, Table VI. A pressure of 50 psi seated the ram on the smaller batch, and 60 psi seated the ram on the larger batch.

The above studies on laboratory Banbury mixing variables indicate that for a specific rubber-reinforcing black pigment blend, times required to reach an equivalent mix are primarily dependent on rotor speed provided sufficient ram pressure is applied to seat the ram.

Mixing Properties of Various Carbon Blacks

Banbury black incorporation times were used to compare the rate at which MPC, EPC, SAF, ISAF, HAF, FEF, and SRF blacks were incorporated by type 1712 styrene rubber, Table VII. The low structure blacks, MPC, EPC, and SRF produced power

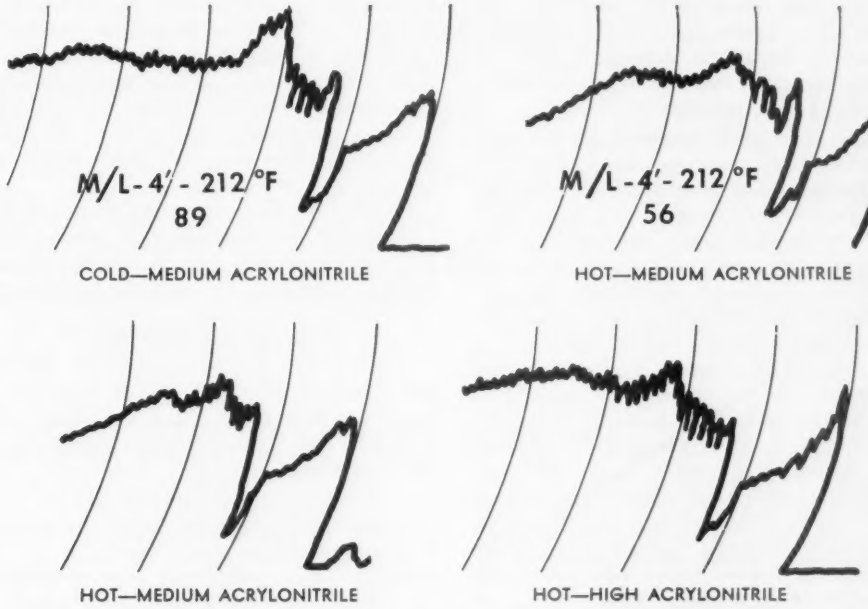

FIG. 5—Banbury power curves of acrylonitrile-butadiene rubbers.

TABLE VII—BLACK INCORPORATION TIMES OF VARIOUS CARBON BLACKS

Recipe D
Ram pressure, 50 psi; rotor speed, 80 rpm

Black Type	Black Incorporation Time (min.)	M/L-4'-212°F. Compound
MPC	1.70	62
EPC	1.20	63
SAF	1.65	72
ISAF	1.55	65
HAF	1.50	60
FEF	1.30	62
SRF	1.10	48

TABLE VIII—VISCOSITY AND CONVERSION VS. PROCESSIBILITY OF TYPE 1502 STYRENE RUBBER

Recipe A
Ram pressure, 50 psi; rotor speed, 80 rpm

Conversion (%)	M/L-4'-212°F. Polymer	Black Incorporation Time (min.)
59	39.5	0.80
58	57.5	1.10
59	68.0	1.60
50	47.0	0.75
60	53.0	0.85
69	52.5	1.10

curves lacking the pronounced maxima and minima points obtained with the high structure reinforcing furnace blacks. Black incorporation times obtained on the furnace blacks were related to their particle sizes, the smaller the particle size the longer the black incorporation times. However, these differences were not pronounced for the highly reinforcing types. As anticipated, EPC was incorporated faster than MPC by this rubber. Dispersion of the channel blacks appeared to be a more gradual process than dispersion of the furnace blacks as judged by the development of a smooth shiny texture in the mixed stocks.

Mooney Viscosity versus Processing Properties

Black incorporation times were used to measure processing differences in six experimental type 1502 styrene rubbers made to various Mooney viscosity levels and per cent conversions. Results of this study are given in Table VIII. Three samples were made to three Mooney viscosity levels at the same per cent conversion. With the rubbers made to the same per cent conversion, an increase in Mooney viscosity of 20 and 30 points increased black incorporation times by factors of 1.4 and 2 respectively.

Three samples were made to the same Mooney viscosity level at three conversion levels. Per cent conversion within the limits investigated had a lesser effect on black incorporation time than Mooney viscosity. This study indicated that high conversion rubber made to higher than conventional Mooney viscosity levels would have very poor Banbury processing characteristics.

A quality control test based upon Banbury black incorporation times is currently being made on all Plioflex rubbers at the polymer plant. The test is being used to screen out poor processing lots of rubber, and it will assist in the adjustment of polymerization variables to produce styrene rubbers having uniform processing properties.

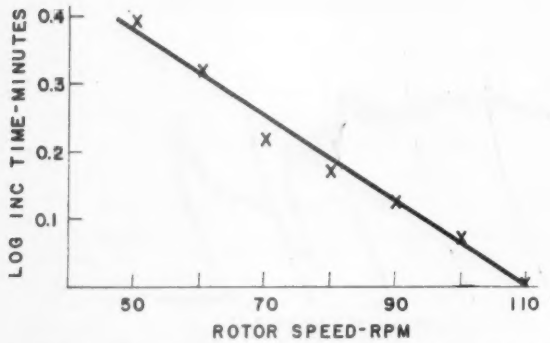

FIG. 6—Log of black incorporation time versus rotor speed.

Summary and Conclusions

Times required for incorporation and equivalent states of dispersion of reinforcing furnace blacks in styrene and acrylonitrile-butadiene rubbers can be accurately measured from laboratory Banbury power consumption curves. These curves are typical and reproducible for the various types of these two rubbers, and they are sensitive enough to distinguish minor differences in black pigment incorporation times between various lots of a specific type of rubber.

Laboratory Banbury power consumption curves enable a quantitative evaluation to be made on the effects of Banbury mixing variables on rate of pigment incorporation by a rubber.

Banbury black incorporation times can be used as a rapid test for screening experimental rubbers for processing properties, and as a quality control test on styrene rubbers at the synthetic polymer plant.

ACKNOWLEDGMENT

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RUBBER versus PLASTICS in the Footwear and Floor Tile Industries

A panel debate held before the Quebec Rubber and Plastics Group

ONE of the most successful meetings held last year by the Quebec Rubber and Plastics Group of Montreal, Quebec, Canada, featured a panel debate on the relative merits of rubber and plastics in the footwear and floor tile industries. The editors of RUBBER AGE thought the opposing positions of the speakers emphasized certain points which would interest our readers as much as they did the audience who heard the debate. The panelists have graciously organized their thoughts into a form suitable for publication, and their revised remarks are presented herewith.

For the footwear industry Hugh Beland, Dominion Rubber Co., Ltd., advocated the use of rubber, and A. Beverley Lewis, British Rubber Co., Ltd., the use of plastics. Cliff Lamb, American Biltrite Rubber Co. (Canada), Ltd., supported the use of rubber in floor tile, and Ian MacLaine, Dominion Oilcloth & Linoleum Co., plastics for this application. O. R. Huggenberger, Dominion Rubber Co., Ltd., served as moderator. The revised talks of the panelists, and a complete transcript of the question-and-answer period which came after the debate, are presented on the following pages.

Rubber in the Floor Tile Industry

By CLIFF LAMB

American Biltrite Rubber Co. (Canada), Ltd., Sherbrooke, Quebec, Canada

IN THE flooring industry, the plastics compounder enjoys numerous advantages over his colleague compounding rubber. Vinyl can be compounded to be almost completely transparent, and this property is the key to the many three dimensional and marble-like effect now available in plastic flooring. At fusing temperature, vinyl, regardless of durometer hardness is viscous and readily knits during molding, this characteristic being exploited to give the many terrazzo effects.

Rubber is versatile, but to compound for the 95-98 Shore A stocks used to produce tile, it is necessary to load it with a minimum of 300 parts of inert filler such as clay. This loading removes any possibility of translucency and almost destroys the knitting qualities of the polymer, so rubber tile production is almost entirely restricted to the originally developed method, which involves marbleizing at the calender and press curing the resulting sheets.

Visually, it is impossible to determine whether a piece of dark-colored, unused, and freshly waxed rubber tile was manufactured yesterday or 30 years ago, but quality-wise the story is vastly different. The first major step forward came with the introduction of high styrene resin. The incorporation of this material improved hardness and resilience, but even more important, it facilitated production so much that rubber tile was no longer a "specialty" product.

The next advance came when non-staining styrene rubber became available. The changeover to Krylene N.S. improved fadeometer resistance beyond expectations, and now customer complaints directly attributable to sunlight exposure are a thing of the past. These and numerous minor improvements give us the product we have today—a flooring unsurpassed for resilience, comfort, and safety—a flooring which if properly maintained, will give a lifetime of service. These qualities compensate fully for the lack of scope in design a rubber compounder has when competing with plastics in the flooring field.

Plastics in the Floor Tile Industry

By IAN MacLAINE

Dominion Oilcloth & Linoleum Co., Ltd., Montreal, Quebec, Canada

THIS debate suggests two protagonists—rubber and plastic—struggling for material supremacy in the footwear and smooth surface flooring industries. In my opinion this is not sufficiently accurate or complete. Most of us who are working in these industries will recognize the over-all conflict as one between "man-made polymers" and those substances harvested from plant and animal life which have been the traditional materials used in the footwear and floorcovering industries for generations. A further problem lies in the increasingly ill-defined difference between elastomers and resins brought about by the introduction of new polymers which may resemble either a rubber or a plastic under differing conditions of use.

Despite these difficulties, I will try, to briefly examine the interrelationship of rubber and plastics in the smooth surface floorcovering industry and take stock of the progress of plastics in this industry.

Most of us will recall that following the Second World War, an evolution began to shape up in the floorcovering industry. Vinyl resins were becoming increasingly available and the segment of the chemical industry producing these resins pressed for the development and expansion of new end uses. The flooring industry generally recognized the potential of these resins, but the time did not appear propitious for extensive development and conversion of the industry. Nothing resembling a race ever developed. The reasons for this were probably that the industry faced a large and expanding demand for their established products; new plant and tremendous conversion costs would also be necessary, and the resin prices were so high that the market appeared quite restricted.

However, with prosperity and the expanding economy of the United States and Canada, all kinds of new products were being readily accepted by the consumer and the few flooring manufacturers who pioneered the introduction of vinyl tile and yard goods were very successful. The new flooring products attained a steadily mounting reputation and acceptance despite some overselling and disappointments that resulted from poorly conceived advertising.

The superior physical and chemical properties of the products, improved flooring manufacturing techniques, and lower resin prices produced an accelerated growth. Vinyl flooring made its initial impact on the United States flooring market in the years 1947-48, while the Canadian market lagged in recognition until the years 1953-54. At the present time, approximately 10 and 5 years later, vinyl flooring has become a substantial factor in the flooring markets of both countries.

A United States market survey for the year 1956 showed the following estimated area distribution for smooth surface floorcovering:

Printed felt base	45%	
Asphalt tile	20%	
Linoleum	13%	
Vinyl-Asbestos	9%	
Vinyl (Homogeneous)	9%	18% for vinyl plastics
Rubber	3.3%	
Cork	0.7%	
	100%	

Similar distribution estimates are not available for Canada. However, Canadian D.B.S. figures show that rubber enjoyed steadily growing sales until the year 1955 when a 30% decline was experienced from 1954. During this same year, vinyl-asbestos sales climbed by almost twice the loss in rubber. It would be highly gratuitous to assume that vinyl-asbestos was responsible for this, since the homogeneous grade of vinyl tile was also growing in popularity. I also believe that there was a trend to 80 gauge rubber developing at this time.

A comparison of Canadian D.B.S. figures for the past few years is interesting. These are expresed in millions of square feet converted to a ⅛-inch thickness basis.

	Vinyl-Asbestos	Rubber
1953	Not reported	8.5
1954	5.8	8.3
1955	10.0	5.9
1956	13.7	..
1957	18.0 (Projected)	..
1958	23.0 "	..

All the established flooring manufacturers in the United States have introduced companion vinyl products to their established lines over the past 11 years. As a result, between the years 1950 and 1956 the consumption of vinyl resins in this industry has increased from 10 to 65 million pounds. This includes dispersion, calendering, and soluble grades of vinyl resin, and represents the greatest single use growth for vinyl resins. The D.B.S. figures I have just quoted indicate a threefold growth over the past three years which almost proportionately matches the U. S. growth rate for resin.

I would like to suggest the following, as some of the reasons, for the ready consumer acceptance of vinyl flooring:

(1) Brilliant clean colors are available in vinyl flooring.

(2) Lowering resin costs have placed vinyl tile in

a competitive price range with rubber and heavier grades of linoleum.

(3) Outstanding chemical resistance permits a wide range of application.

(4) Vinyl-asbestos tile has proven that it may be successfully applied over potentially damp concrete, where formerly asphalt tile was the only satisfactory product.

I think we can sum up in this way: The future of plastics in the flooring industry is assured. Whether polyvinyl chloride will become the main resin of the flooring industry is still in doubt. However, this family of resins is firmly entrenched and great future growth is indicated.

I am certain that the vinyl resins we know today will meet with many viscissitudes, and improved polymers for the products of the floorcovering industry will result. We may well be approaching the point of obsolescence of natural products for new market growth in this industry.

Rubber in the Footwear Industry

By HUGH BELAND

Dominion Rubber Co., Ltd., St. Jerome, Quebec, Canada

IT IS my assignment to demonstrate the numerous advantages of rubber footwear over plastic. From an enumeration of the items of clothing in general use today, it seems that plastics are beating rubber 4 to 1. This may be true in several applications, but cannot be applied to the footwear trade.

Let us review the several factors favoring the use of rubber for footwear manufacturing. First consider the physical properties required for good wearing waterproof footwear. For the upper part of the shoe, a good tensile strength is required, and high elongation and a low permanent set for fit and appearance are essential. Finally, a high tear is of the utmost importance.

In the case of a rubber shoe, these properties can be obtained easily with a relatively inexpensive compound containing approximately 45 to 50% total rubber hydrocarbon. The loading will consist of 20 to 30 parts of carbon black for a black upper, and the same quantity of a white reinforcing filler for light-colored uppers. Inexpensive fillers, such as calcium carbonate, which costs from 1 to 3 cents per pound, can be added to decrease cost further. A first quality upper costing 18 to 20c per pound can be compounded to have tensile strength of 2000 to 2500 pounds per square inch, an elongation of over 500% with a low set of 10 to 20%, and a tear strength of over 150 pounds per inch.

A second grade upper costing in the neighborhood of 14 to 16c per pound but still having adequate physical properties for normal wear can be produced by adding larger amounts of fillers. The soling portion possesses slightly different physical properties, the tensile strength is not as high as that of first grade upper stock, but the most important property, resistance to wear, or good abrasion resistance, is retained. Excellent abrasion resistance in rubber can be obtained by loading with various types of carbon blacks or silica; these stocks cost only 10 to 15c per pound and the loading will vary according to the type of wear required and the selling price of the article.

A great variety of styles and compounds for specific uses can be produced with rubber either natural or synthetic. Now, if we replace rubber with plastic, let us compare the physical properties. The tensile strength and elongation obtained with plastic will fall between a first quality and a second quality upper made with rubber, so plastic can be considered quite satisfactory. On the other hand, plastic does not have the elasticity of rubber, so that it is extremely difficult to obtain a suitable low set. The high set usually found with plastic footwear does not affect the quality but affects its appearance. After a shoe has been stored for a while in a carton, it will not go back to its original shape, thus affecting its appearance and sales appeal.

Comparing abrasion, we have said that rubber can be reinforced to increase abrasion. This is not so in the case of plastic; therefore, a high quality rubber soling stock cannot be replaced by plastic, and for this reason plastic footwear can be compared only to a second grade rubber stock when considering abrasion.

Another bad feature of plastic footwear is its poor resistance to cut growth. Satisfactory wear is obtained on ice, snow, even cement, but it is deteriorated very rapidly when worn on a sanded sidewalk. The little grains of sand having sharp edges cut right through the plastic and work their way through the full thickness of the sole, thus producing a worthless shoe in a short time. This is not the case with rubber stocks.

Waterproof footwear is worn most of the time in cold weather, at least in Canada; rubber has excellent cold resistance, it will remain flexible at —40°F. without any special compounding. By adding cold-resistant materials, rubber can be made to remain flexible at temperatures as low as —70°F. Such was the case of Mukluks sold to the Canadian Government and the domestic trade in the Arctic.

Polyvinyl chloride resin by itself is very hard and brittle at cold temperature. It can be plasticized with cold-resistant plasticizers such as the adipates, the azelates, and the sebacates to obtain better flexibility in cold weather. The resistance to cold is proportional to the types and amounts of plasticizers used but when added in large quantities, they will interfere with other

properties such as dryness of film, viscosity, set and fusing rate. When selecting a happy medium among the various properties, the maximum flexibility that can be obtained is at around —10 to —20°F., some 20° higher than the temperature at which rubber will remain flexible.

Some users do not like the smell of plastic shoes; this is not a major complaint as an odorant can be added to change the odor, but that again increases the cost of the shoe.

The rubber chemists tried for a long time to produce a transparent colorless rubber footwear. We had had no success when plastics came to our rescue. A beautiful colorless footwear could be produced with plastisols made from polyvinyl chloride resins. Everybody was quite happy about this novelty until it was found that after a few weeks wear, the beautiful colorless shoe became soiled. Now more and more plastic shoes are being made in opaque colors to hide the dirt and stains which appear inside the shoe.

Comparison of Materials Costs

Now we will glance quickly at the cost of materials. Natural rubber costs at present 25 to 32c depending on the grade. Synthetic rubber (mostly styrene rubber) costs 24c. As it can be loaded up to 200% with cheap fillers without affecting the properties required, a final product costing 10 to 20c per pound can be produced. Polyvinyl chloride resin costs between 20 to 33c per pound, plasticizers vary from 25 to 75c, and no loading over 10 to 20% is possible, so that the final product will cost from 32 to 40c per pound. The cost of plastic material is almost twice that of rubber.

The most important advantage of plastic footwear is its low labor cost due to the slush molding process in which a complete shoe can be made with one single compound in a relatively short time compared to the several component parts and long process time required for rubber footwear. Also investment in capital is much lower to manufacture plastic footwear, but in a community such as ours, we have to consider the economic factors as well as the human factor; if we were to replace the total production of rubber footwear by an equivalent volume of plastic footwear, we would lay off over 90% of our employees. Of course, this is no reason to stop progress if a much superior product can be obtained; and if this were the case, we would be under moral obligation to develop new products and new processes to take care of the unemployment situation.

In the short time made available I have covered the subject sufficiently so that you can judge for yourselves the superiority of rubber over plastic. I have to concede that plastic has its place in our footwear industry, but it cannot replace rubber.

Plastics in the Footwear Industry

By A. BEVERLEY LEWIS

British Rubber Co., Ltd., Montreal, Quebec, Canada

FOLLOWING the Second World War, the psychological enlightment of the Asiatic countries, combined with the desire on the part of the Allies to promote trade as a means of improving living standards and combatting Communism in those nations, led to an ever increasing importation of rubber footwear into Canada. The bulk of this has come from Hong Kong and Japan, where the wage scale and living standards are far below that of the Canadian worker. This has been and still is a very grave concern to the rubber footwear industry, where a high percentage of labor is required to prepare, cut, pre-assemble and generally put together a number of uncured rubber parts into a finished product.

Many efforts have been made towards mechanization, but in most cases they have encountered one problem—the real obstacle of the multitude of lines that have to be supplied when dealing with a fashion-conscious public. The problem is further complicated by the fact that each of the literally hundreds of lines that have to be produced must be made in a full range of sizes, half-sizes and then, to top it all off, in lefts and rights. The scheduling detail alone for a normal footwear factory, for a day's operation, is a monumental task.

British Rubber Co., through a wholly owned subsidiary, became the first rubber footwear manufacturer in Canada to produce plastic protective footwear on a production scale. These shoes were mainly for women and were made by dipping aluminum forms in an organosol, to produce a thin but tough upper, followed by a dip in a thick plastisol to produce the soling. Although light in weight and very practical, they left a lot to be desired stylewise, and were generally so different from conventional footwear that they were not widely accepted.

The plastisol used in slush molding is generally a relatively low viscosity liquid dispersion of vinyl resin powder in a suitable combination of plasticizers which are relatively inactive at room temperature, but which rapidly solvate the vinyl resin at elevated temperatures. It is very much like paint, except that it is

100% solids—that is, the solvent is so high boiling that it remains forever retained in the finished fused vinyl article.

The molding technique consists of filling a female thin-walled mold, which has the desired decorative design, on the inside, with the plastisol. Heat is selectively applied to jell a layer of the desired thickness on the inside walls of the mold. The unjelled liquid is then drained out and the jelled layer fused at higher temperatures. The article is stripped from the mold after cooling, and then goes through subsequent trimming and finishing operations, such as putting on hardware. This description is, to say the least, a gross over-simplification.

Canada has been ahead of most other countries in developing slush molding techniques. To my knowledge two of the major producers of plastic footwear in Canada have been involved in setting up operations with their know-how in other countries.

One criticism of plastic footwear is a tendency to slide. It is true that vinyl compounds are slippery and that they have a low coefficient of friction, but for that very reason they also have excellent abrasion resistance. On the type of abrader we use for testing, the plastic material runs several times better than an average rubber footwear compound.

As for the question of cutting—yes, there were originally a lot of plastic shoes made that did cut readily, but that has been answered by sole design. By designing the sole of the shoe properly the continuous surface is kept well above the walking surface. The abrasion resistance is so good on vinyl that it does not need a large area of contact. A design which simply rests on points or lines, keeping the main part of the sole well above the walking surface and eliminating the problem of sharp objects piercing through the soles, is sufficient to give long wear.

In regard to flexibility at low temperatures, we were horrified, a couple of years ago, when we took competitive rubber overshoes and ran low temperature tests on them. We used to think that all rubber, being a thermoset material, was relatively independent of temperature and therefore very good at sub-zero temperatures. But, in the highly competitive field of rubber footwear, so much "garbage" has been put into some of the compounds that we found that they cracked, and at temperatures very little below zero they became as hard as a rock. Now granted, the plastic shoes also became hard, but steps have been taken so that today the question of low temperature cracking is pretty well non-existent in plastic footwear. I am not speaking for our company alone; I think the whole plastic shoe industry in Canada is doing a good job in this respect.

Smell? Well, a good old piece of reclaim rubber smells just about as bad as anything I can think of. By comparison vinyl smells like a bouquet of roses.

One point in favor of plastic footwear is that they are cast in one piece and are therefore less liable to leak. In some heavier lines of plastic overshoes as many as four different compounds are used so that it is not quite as simple as just pouring a liquid in and out of the mold and fusing the layer that remains inside.

Questions and Answers

Question: Is Hypalon suitable as a base for floor tile?

Answered by Mr. Lamb: Hypalon tile is available and is being used for special applications such as laboratory floors and patios. Its chief advantages are its excellent resistance to chemicals, weather, and ozone, but cost prevents it giving any immediate serious competition to established floorings.

Question: Please discuss low temperature properties of rubber and vinyl footwear.

Answered by Mr. Beland: Mr. Lewis said that the cold resistance of rubber is not always what it should be, because we put a lot of garbage in our compounds, but I can say that we are working with very close specifications and the garbage pail is very far from our mill room. I submit that plastic footwear is very slippery when cold. Some slight stiffness, however, would not be a major objection. The slipperiness is the principal difficulty.

Answered by Mr. Lewis: The subject of low temperature properties has been of paramount interest in the development of vinyl plastic footwear in Canada. I think all companies, including our own, in the early stages put out compounds that did not have sufficient low temperature resistance. Of course, that all happened in conjunction with the year in which we had all-time record low temperatures, but that problem has ironed itself out just as rubber compounding has. There is no question that natural rubber can be made to have much better low temperature properties than vinyl, but in footwear there is a limit to how far one has to go. I do not believe that vinyl is incapable of being compounded to perform satisfactorily in a Canadian winter.

Question: What is the status of the brief presented to the Canadian government on behalf of the footwear industry with regard to imports?

Answered by Mr. Lewis: In the Tariff Board hearing on the plight of the rubber footwear industry

RUBBER versus PLASTICS

A Panel Debate

In Canada, the Tariff Board did ask if the rubber footwear industry problem is all import or does it hinge partly on the development of plastic footwear in Canada. Frankly, I think the Board was right in asking that question because without doubt when there are three million pairs of plastic footwear made in Canada in a year, it must affect the rubber footwear industry. This number happens to be about the same quantity as is imported.

Question: Why not replace rubber and/or plastics in footwear with leather?

Answered by Mr. Beland: The main characteristic of rubber is its waterproofness. The main characteristic of leather is its breathability. We are wearing leather shoes because we want our feet to breathe. We wear rubber shoes because we want our feet warm and kept away from the rain or wet snow. Also leather is quite expensive and it is not workable the same way as rubber.

Answered by Mr. Lewis: They are now making a leather with Dow Corning Sylplex treatment which is breathable and still waterproof. It definitely has an application in such things as woodsmen's boots, where the problem of wearing rubber or plastic footwear can cause excessive sweating. If your feet are moist, they will freeze. That is one of the points that was brought out in connection with Arctic tests that the Arctic Services conducted recently. They indicated that the men who did not dry out their footwear properly were the only ones who got frozen feet. If you have rubber footwear or plastic footwear, you will keep your feet dry, but you would have a better shoe if it could breathe and of its own accord remove any moisture from perspiration. The new waterproof leather is definitely a threat to certain lines of rubber and plastic footwear.

Answered by Mr. Huggenberger: I think this only indicates we've got to be alive to all possible materials from which to manufacture our products.

Question: How does one patch children's plastic overboots when they split open at the toe during the first winter of wear?

Answered by Mr. Lewis: Many of the shoes that split open are not properly fused and you might as well just throw them away or take them back to the store for a new pair. But there is one alternative—over the years the shoe repair man has learned how to repair rubber footwear that gets snagged or otherwise punctured, and he keeps rubber cement and rubber patches on hand to do it. There are definite techniques available to repair plastic footwear. With a little skill it can be done with a small alcohol torch, with which it can be fused back together again. It can also be done with a hot knife, simply by heating the knife over a flame, passing it through the cut, and then butting the two pieces together. There are also plastic cements on the market that can be used to apply a small patch cut from a calendered vinyl sheet.

Question: What is the correlation of Fadeometer reading with actual exposure to sunlight, and how do rubber and vinyl compare in fading resistance?

Answered by Mr. Lamb: Both rubber and vinyl fade to a degree in both the Fadeometer and in sunlight, but thanks to Krylene N.S. it is not so severe with rubber as it used to be. With regard to the correlation between Fadeometer and actual sunlight, I do not know if it is possible to exactly correlate, but I did perform tests and found that 80 to 100 hours in hot July Montreal sun was the equivalent of about 20 hours in the Fadeometer. That was with rubber tile. I do not know if it would be the same with vinyl tile or with any other product. However, since then, I have always assumed that four hours of summer sun exposure is equivalent to one hour in the Fadeometer.

Question: Please comment on the amount of maintenance required on vinyl tile versus rubber tile.

Answered by Mr. MacLaine: It depends largely upon the type of vinyl tile. Certainly there can be significant differences in vinyl tile as far as soil collection and maintenance is concerned. Homogeneous vinyl tile is generally considered better in that regard than the vinyl-asbestos grade. Foster D. Snell Laboratories published some information to the effect that all floorings need maintenance to look their best. This is definitely our feeling. We are sure that there has been much overselling on the "no maintenance" aspect of vinyl tile. To have flooring looking good and clean it must be washed and waxed regularly since light bright colorings of 60% reflectance and greater are in vogue for this type of flooring.

Question: Would you say that it is more easily maintained than rubber tile?

Answered by Mr. MacLaine: There are many differences in rubber tile, too. I do not think one can make a general statement. There have been some very bad rubber floorings and there have been some very good rubber floorings. Service conditions and type of maintenance practice are significant factors in ease and frequency of cleaning.

Question: Has the general tendency of vinyl flooring to stain been overcome?

Answered by Mr. MacLaine: I think largely so with the newer type of plasticizers and stabilizers. Much of the poor experience resulted from lead sulfide staining.

Question: Rubber tile is certainly less subject to staining, though, than vinyl, is it not?

Answered by Mr. MacLaine: I do not think that you can say that today. I think you could have said that some time ago.

Question: I would like to ask Mr. Lewis whether or not he wore a pair of rubber or vinyl overshoes here tonight.

Answered by Mr. Lewis: I wore vinyl and saw several other pairs in the cloakroom.

Question: Where did you buy them and how much do they cost?

Answered by Mr. Lewis: They are listed in Eaton's Mail Order Catalog at $2.59. You cannot buy a rubber overshoe for men under $3.98.

Question: Has the discoloration of clear vinyl overshoes been overcome?

Answered by Mr. Lewis: No, it has not on clear shoes and I do not think it ever will be. The industry is trying to convince women that they do not want clear plastic overshoes. Incidentally, this fashion has been a boon to the industry. With the low cost of the clear vinyl overshoe, the women look upon them as they do nylon stockings and do not hesitate to throw them away and buy a new pair.

Question: Have they started to work on vinyl shoes in Hong Kong and Japan? If not, what are you going to do when they do start?

Answered by Mr. Lewis: The answer is they have started.

Question: What is the cost of vinyl flooring versus rubber flooring?

Answered by Mr. Lamb: It is difficult to make an accurate comparison, but I have some rough retail figures which show that ⅛-inch rubber tile, laid, costs 55 to 60 cents per square foot; the same thing in vinyl-asbestos would cost 40 to 60 cents per square foot. Homogeneous vinyl tile ranges anywhere between $.60 and $1.60 a square foot, depending on the style.

Question: What are the trends in the mastic tile business?

Answered by Mr. MacLaine: I think it is a pertinent question because a very large part of the mastic tile is a chemical industry product. The cumarone-indene resins are a substantial portion of it. The asphalt or mastic tile business in Canada stands at about twenty million square feet and has remained at that for a number of years, varying up or down a couple of million square feet. In the United States it is at about a billion square feet right at the moment—800,000 to a billion. It looks as though there will always be a place for mastic tile. It is a very low cost product in the A and B groups anyway, and in the C and D groups it approaches the vinyl asbestos price range, which I think is 17.9 cents for the D group in the manufacturers' list price at the moment. Vinyl asbestos manufacturers' list is on the order of 35.6 cents on the ⅛-inch basis.

Question: It used to be said of the rubber industry that the processing of rubber was an art. I wonder if the panelists would care to comment as to whether the processing of plastics is more of an art or more of a science.

Answered by Mr. Lewis: As far as I am concerned there is far more art in plastic processing than there is in rubber. It requires a much more difficult know-how than does rubber.

Answered by Mr. Beland: I do not agree, I would say that plastics is a newer art or science, and that we have to start from scratch. Rubber has been known to us for a long while. My estimate is that rubber and plastics are both about 50/50 art and science.

Answered by Mr. MacLaine: I cannot make a comparison between the rubber and plastic flooring industries too well, as I have not had any experience in the rubber tile business; but I can make the comparison between vinyl processing and linoleum processing, and I think that the degree of art or science in the linoleum industry must be somewhat similar to that of the rubber industry. I feel that there is a little more art in the linoleum end of things than there is in the vinyl plastic end. I think there is a somewhat more simple straightforward type of processing in plastics, because it is less complex and there are fewer intricate steps in processing than are found in linoleum processing.

Answered by Mr. Lamb: If the term applies to rubber processing, then plastic processing must also be described as an art. Similar equipment is involved, and quite a few of the problems encountered are identical to the problems experienced when processing rubber.

Question: Is it generally accepted that companies making plastic shoes, or their distributors, refund money without question or complaints?

Answered by Mr. Lewis: That is correct. In the case of our company, we give full credit for shoes returned for premature failure.

Question: If that is so, why have not any rubber manufacturers been forced into the same policy?

Answered by Mr. Lewis: In many cases of returned goods, both in rubber and in plastic, the product has been misused, as when fine Italian-style spike heels are worn in overshoes. I have also seen children's overshoes broken up the back when it was obvious that they were old and that the children's feet had grown and pushed right through the shoes.

Question: With the plastics there seems to be much more of this than with rubber?

Answered by Mr. Lewis: I think I admitted, certainly, on the behalf of our company, that we made serious mistakes when we were getting into plastic footwear. For that reason, we adopted a policy of never questioning returned goods. If the product fails, we always have given a full credit. How long we can go on doing this I do not know.

Question: I have a sample here of a vinyl tile and a rubber tile. To me it appears that somebody has marred the rubber tile. I have tried marring the vinyl tile and the vinyl does not show any scratches on it, whereas the rubber is quite obviously marked. Would any of you know if that is a fact that rubber does mark a lot easier than the vinyl tile?

Answered by Mr. MacLaine: Rubber tile sells for 43.5c a square foot, the manufacturers' list price for ⅛-inch tile, and the vinyl tile you hold is about $1.50 per square foot. You should expect difference in quality.

Question: Is resistance to scratching a criterion for evaluation?

Answered by Mr. MacLaine: Even steel plate scratches. I do not think you can make a very good evaluation by comparing the amount of scratching. Vinyl will scratch and so will rubber.

Question: How does a layman make a choice between rubber and vinyl?

Answered by Mr. Lamb: It depends on what qualities he wants, whether it be resilience, quietness, safety or appearance.

Answered by Mr. MacLaine: There are some obvious things that will help in deciding. Certainly the amount of money he wants to spend is one. Where does he want to install it, in a basement, in a playroom, or in an area where it is not going to be used much? Is it to be decorative? Is the house a rented dwelling or it is a summer camp? All of these things interrelate with price and function.

Question: Wearability is always an interesting criterion.

Answered by Mr. MacLaine: Yes, but really durability, in a domestic application, is found in any of the tiles that we have been talking about. This is not a factor.

Question: Is maintenance a big factor there?

Answered by Mr. MacLaine: I would say maintenance and appearance and foot comfort are some of the things one would think about.

Question: If you are looking for those things, I suggest you buy rubber.

Answered by Mr. MacLaine: I purposely stayed away from this, but at this time I just cannot help but say I think you should buy linoleum. Certainly that would be the best consumer dollar buy in any kind of flooring.

Answered by Mr. Lewis: The tendency for home use is to buy the surface which will give you the best shine with the least effort.

Answered by Mr. MacLaine: I still think linoleum tile is the most comfortable, the easiest to clean and the most resilient.

Question: What about the newer types of plastic or flooring which outlast vinyl and rubber many times?

Answered by Mr. Lamb: But why outlast them, when ⅛-inch rubber tile will wear for twenty years, if properly maintained.

Answered by Mr. MacLaine: I do not think there is any appreciable or any considerable competition from any other type of plastic product.

Answered by Mr. Lewis: The major usage is in either business offices or homes, and there wear is not a major problem. I think what the plastic people would like to have is a plastic that they can load with about 200 parts of clay, like rubber.

Question: I would like to ask the gentlemen representing the vinyl team about polyvinyl-acetate floor tile.

Answered by Mr. MacLaine: There certainly has been a bit of floor covering produced with polyvinyl acetate. I remember a European floor covering composed principally of polyvinyl acetate. It was either a calendered product or a coated product, possibly two millimeters thick. As far as polyvinyl acetate is concerned, it is definitely inferior in resistance to solvents, such as alcohol, and the ketone solvents. It also has poor alkaline water resistance and will soften quite appreciably, especially when loaded. The one feature of benefit is its grease and oil resistance, but I do not think it is competive with PVC in price and performance.

Evaluation of

Leather Impregnants

WHEN choosing an impregnant to improve the properties of leather, first consideration should be given to the molecular weight of the elastomer component, according to a National Bureau of Standards study for the Navy Bureau of Supplies and Accounts. It is the elastomer blended in the impregnating solution which improves leather's wear and water resistance. The study shows, however, that the degree of improvement achieved depends on the amount of impregnant deposited throughout the leather's thickness, and that only elastomers with a molecular weight of less than 10,000 can effectively penetrate the leather. Best results are obtained with impregnants incorporating elastomers such as polybutene, polyisobutylene, or butyl rubber, in combination with resins [Fouquet, Bernard H., and Kanagy, Joseph R., "Impregnation of Sole Leather with Polymers," *J. Am. Leather Chemists Assoc.*, Vol. 53, p. 336 (1958)].

At the request of the Army Quartermaster General, a research program to increase the wear of shoe leather was started at the Bureau several years ago. Early investigations disclosed that polymeric substances can be deposited in the woven matrix of leather's collagen fibers, and that proper impregnation with these substances prolongs serviceability. Impregnating techniques devised at the Bureau in 1955 are now employed by industry to produce leathers having various degrees of waterproofness, flexibility and durability [Oehler, René, Davis, John H., and Kinmonth, Raymond, "A Pilot Plant Study of the Process for Treating Heavy Leather with Polyisobutylene and Other Polymers," *J. Am. Leather Chemists Assoc.*, Vol. 50, p. 16 (1955); "Improved Techniques for Impregnating Leather," *NBS Tech. News Bull.*, Vol. 39, p. 96 (1955)].

At the time these techniques were developed elastomers with molecular weights of from 50,000 to 100,000 were generally used for impregnants. But since then elastomers with low molecular weights have become increasingly popular because they provide greater ease of handling. To compare the properties imparted to leather by the variety of materials now available, B. H. Fouquet and J. R. Kanagy of the Bureau's leather laboratory undertook the work described here.

Experimental Procedure and Results

Dried vegetable-tanned crust leather was used in the experiments to assure maximum absorption of the

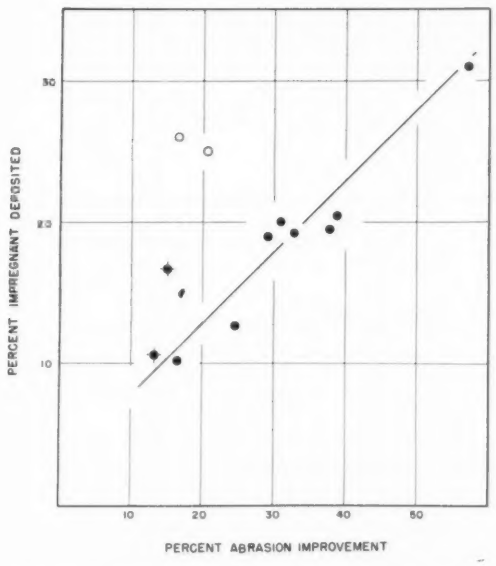


FIG. 1—Effect of amount of impregnant deposited on abrasion resistance of leather (dot = low-molecular-weight elastomers; crossed dot = high-molecular-weight elastomers; circle = resin and oil blend).

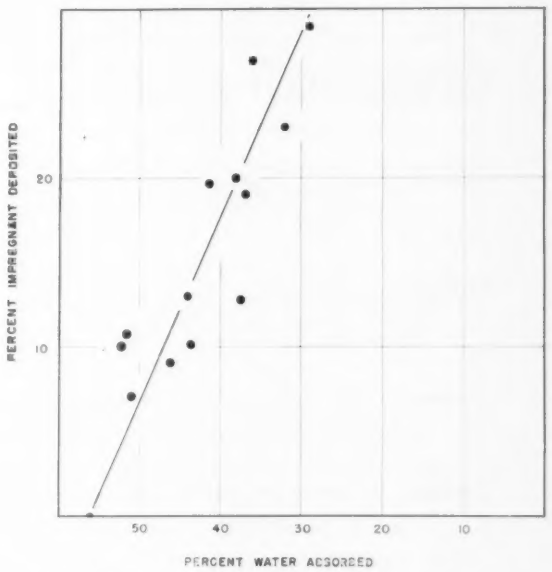


FIG. 2—Effect of amount of impregnant deposited on water absorption of leather.

FIG. 3—Setting up the apparatus to extract impregnant from leather.

impregnant. Previous experiments had shown that impregnation with elastomeric materials affected the dimensional stability of sole leather during service. To eliminate this defect, the elastomers were blended with a semi-hard hydrocarbon resin or with a polymerized rosin in a 2:3 proportion. A low-viscosity solution was made by mixing together equal parts of the blended substance and a pertoleum solvent. After the leather was immersed in this solution for three hours, it was drained and then dried in a forced-draft oven at 40°C. to remove the solvent.

Actual wear tests on shoes worn by Navy personnel showed that wear was improved by 50 per cent. Laboratory tests indicated that water absorption and abrasive resistance are directly proportional to the amount of impregnant deposited in the leather (Figures 1 and 2). The quantities deposited were calculated on a dry basis from the weight of the leather sample before and after impregnation. Depositions of approximately 20 per cent of the low-molecular-weight substances can increase abrasive resistance 30 to 40 per cent and reduce water absorption 35 per cent.

As part of the experiment, the specimens were split into three layers and the impregnant was extracted from each layer with chloroform (Figure 3). It was found that blends containing low-molecular-weight elastomers deposited more than twice as much impregnant in the corium (middle) layer as did blends containing high-molecular-weight elastomers. This variation is attributed to the unequal pore-size distribution throughout the leather matrix, which ranges from the largest size pores in the grain (outer) layer, to the smallest size pores in the corium, to intermediate size pores in the flesh (outer) layer. Therefore, an elastomer with relatively large molecules does not readily penetrate the more compact fibers of corium but tends to remain in the larger pores of the outer layers.

Coming Next Month...

Properties and Performance of Rubber Fillers—By Eli M. Dannenberg, Research and Development Dept., Godfrey M. Cabot, Inc., Cambridge, Mass.

A survey of the effects of particle size and shape, surface area, degree of agglomeration and wetting on rubber processing.

Barium-Cadmium Stabilization of PVC—By Norman L. Perry, Argus Chemical Corp., New York, N. Y.

Barium-cadmium systems can now produce compounds which satisfy almost any processing or end use requirement.

The Modern Cage Motor—By F. C. Osterland, Allis-Chalmers Mfg. Co., Milwaukee, Wisc.

Improved design has resulted in more efficient operation for the rubber manufacturer.

Goodyear's Automated Tire Curing Plant.

A picture story of how a tire is produced in the world's largest and most fully automated curing plant.

EDITORIAL

The Large and Small of It

► The favorite whipping boy of some economic and political pundits in this country has been the heavy concentration of industry. It is often pointed to as a fact that the bigger are getting bigger and the smaller are going out of business. We do not know if the rubber industry is unique, but according to the figures for 1954 released recently by the Department of Commerce, only 21 companies in the rubber industry at that time employed over 1,000 persons.

The Commerce Department indicated that with 1,315 companies active in 1954, 747 employed from 1 to 19 persons. This 1 to 19 person group was the largest category covered. The next largest group covered 20 to 49 persons and here 205 companies were involved. One hundred and thirty companies employed 59 to 99 persons in 1954, while 21 employed from 100 to 249 persons. Fifty-three companies employed between 250 and 499 persons and only 38 employed 500 to 999 persons.

There is, of course, an element of truth in the assertion that today highly automated plants employing relatively few people can consume large quantities of rubber and thus represent a major factor. In essence, however, the number of plants involved in this group are relatively small and in and of themselves do not bear great influence upon the final picture.

What we mean to point out is that the rubber industry is an open industry. There is ample opportunity for both the small and the large company. Certainly, in the face of the statistics, no one will argue that the industry is dominated or monopolized by a relatively few concerns. Smaller companies operate freely and uninhibitedly within our industry at profitable levels.

Since 1954, this rubber industry of ours has grown considerably. In the 1957-58 edition of the RUBBER RED BOOK, for example, we noted that there were close to 1,500 rubber companies operating within the United States. The 1959 RUBBER RED BOOK, now being prepared, will show close to 1,600 rubber companies, and it is believed that the proportionate number of small companies will remain about where it was in 1954.

In the intervening years since publication of the 1954 RUBBER RED BOOK, larger companies have not swallowed up the smaller. To the contrary, the smaller companies have continued to grow and prosper. We like to call these matters to the attention of our readers occasionally. The facts as they are bear witness to the health and vitality of the industry.

Special Industry Report

Problems of the Plant Supervisor

What are the problems of supervisors?

The information appearing on these pages is derived from a survey conducted by *Management Information* to get first-hand reactions from supervisors on what they thought to be their most pressing problems for the year ahead. The 150 companies included in the poll, diversified as to industry, size and geographic location, were asked to distribute questionnaires to ten of their supervisors whom they considered to be a representative cross-section of their organizations. Of the supervisors to whom these anonymous questionnaires were delivered, 64% responded—a remarkably high percentage. To supplement the survey, top executives in the same companies cooperated by responding to the same questions and adding their personal comments, and an additional group of executives contributed their own ideas on supervisory problems. Those interested in obtaining, without cost, a full report on this survey may write to the Elliott Service Co., 30 North MacQuesten Parkway, Mt. Vernon, New York.

IT IS not surprising that in a survey of problems of supervisors that nine out of ten of them should say that their most challenging task is that of human relations. Good management in this area has long been acknowledged as the basis of successful industrial operation. Though the foreman feels that his responsibility for cost control, quality, maintenance and customer service will continue to be important, more than ever he must depend on getting results through people. And stepped up mechanization will increase —not decrease—the importance of the human element.

A high correlation between what the supervisors in 56 industries, including rubber, had to say on this survey and the responses by executives indicates that supervisors are thinking like top management. They have a mature attitude toward their problems, and would like to participate more effectively as members of management. Direct quotations from the comments of the supervisors, only a few of which are given in this article, show a genuine understanding of their managerial problems, and equally, of their opportunities.

Motivation

Of the supervisors participating in the survey, 43% indicated that motivating employees is the specific problem which will give them most difficulty in the year ahead. This is paralleled by the fact that 42% of cooperating executives feel motivation to be the most important supervisory problem.

The survey shows that more than three-fourths of all supervisors want help in understanding their people better—and, significantly, they are equally interested in learning more about treating people as individuals. In fact, many supervisors would like further academic training in the broader aspects of psychology, feeling that this training would be of help in not only knowing their men, but knowing "why" they know them.

Most needed are specific techniques on how to motivate. As one supervisor said:

> "Two areas are particularly in need of development; letting the man know where he stands at regular intervals and getting to know the man well enough so that you can determine the way in which he can best be motivated. Any developments along these lines will be timely and helpful."

There is little evidence of a desire to "crack down." Rather, supervisors are definitely trying to understand the employee's viewpoint. The survey indicates that supervisors have mastered a significant motivational principle: that they should be leaders, not drivers.

> "A long time ago I found I was trying to do the whole job myself, with the thought that no one could do it as well as I could. Then the human relations angle came to my rescue, and I found the measure of leadership is not how well a man can drive workers but how well he can get them to follow him."

Technological Change

More than half of the supervisors (54%) and executives (55%) see the introduction of new processes as the methods change most likely to occur during the coming year. Next, 51% of the supervisors and 49% of the executives see new equipment installation in the picture. Materials handling ranked third, checked by 37% of the supervisors and 30% of the executives.

It is interesting that only 27% of

the supervisors but 48% of the executives checked paperwork simplification as an anticipated technological change. (Some supervisors, however, expressed the wish for less paperwork.) This is the only instance where there was a wide divergence of thinking in the two groups.

In response to the question, "How would you recommend that supervisors win employee support when changes are made," 93% of the supervisors suggested some form of advance participation. Group meetings rank high as a means of winning employee support for changes. (Fifty per cent of the supervisors selected group meetings as the second most effective method of communication, with man-to-man contacts ranking first.)

The need for showing employees how they benefit from changes was stressed by 37% of the supervisors. In this respect they particularly emphasized the safety angle. Also pointed out was the necessity for a clear-cut understanding of wage rates. But in addition to all these points, the supervisors also emphasized the fact that they realized that their own attitude toward change plays an important part in gaining acceptance.

Teamwork

In response to the question, "What do you think will be best way for you to improve work output per manhour," 57% of the supervisors checked, "Stimulate closer teamwork." Teamwork was considered even more essential by the executives (67%).

"A major portion of a supervisor's success is dependent upon the cooperation and teamwork of his personnel. If he is sensitive and responsive to their needs, he greatly increases the teamwork and cooperation he receives."

Among other points revealed by the supervisors were an awareness that teamwork and cooperation require give and take, the value of the "we" approach rather than the "I" approach to work, and that the relationship between cooperation and company success must be stressed.

Communication

Communication is a close second to motivation as a problem which will be a challenge in the year ahead. Both the supervisors (84%) and the executives (88%) feel communication will be more important as a supervisory function. Nearly all indicated that they are anxious to improve man-to-man contacts. Supervisors stressed they should be alert to the values of praise:

"At least three times a year tell the working man what a good job he has done and is doing and pat him on the back at the same time."

"Be as ready to praise for a job well done as you are to criticize a poorly done job."

What supervisors think—

- **Nine out of ten say their most challenging problem is human relations.**
- **The foreman's responsibility for cost control, quality, maintenance and customer service continues to be important, but more than ever, the supervisor must depend on getting results through people.**
- **Stepped-up mechanization will increase—not decrease—the importance of the human element.**

Both executives and supervisors see a close link between company success and communication:

"To me, employee communication is one of the very important functions of a supervisor today. How close he is to his people, their emotions, feelings and daily worries will determine how good a department he runs and in general how effective a supervisor he will be."

Performance

In response to the question, "Which three of the following company problems will make the greatest demands upon you as a supervisor in the year ahead," 74% of supervisors checked keeping costs down; 60% checked keeping quality up; 31% checked giving customers better service; and 61% checked improving employee performance. Significantly, a number of supervisors pointed out the cause and effect relationship of these items. If one improves employee performance, then costs, quality, waste and good safety records will fall in line.

"One of the greatest possibilities for increased efficiency in industry is the proper motivation of employees to do a good honest day's work. This can only be accomplished by superior leadership on the part of the supervisor or foreman."

The survey showed that, obviously, supervisors want ways to make workers aware of the effect of employee performance on costs, quality and customer service. They emphasized the need for help in setting realistic goals; and made repeated mention of the need on their part for fairness and impartiality.

Supervisors are interested not only in instruction techniques, but in showing the worker the essential part his particular job plays. They want suggestions on how to build pride in the product and service of the company. In other words, supervisors feel one of their main problems for the coming year is putting over to employees the relationship between costs, competitive competence, profits and job security.

Management Participation

An impression gained from an analysis of the survey is that supervisors are essentially management-minded and desire closer participation with higher management. They also feel the need for aid in making their potentialities realizable:

"Cleancut responsibilities: do we work or do we supervise?"

Conversely, cooperating executives indicate that top management wants to include supervisors as part of management, and wishes that they would take more initiative in assuming their rightful managerial responsibilities:

"It would be helpful if training material could be developed to answer the following need: the supervisor's inability to look at a particular problem — really see that at which he looks—be able to analyze the problem involved—take corrective action and follow up to a satisfactory conclusion on his own initiative."

The unusually high number of supervisors who responded to the survey and their answers show that they are enthusiastic about participating as an active part of management. They are aware of the need for cooperation with other departments, and conscious of the necessity for working toward the goals and objectives of the organization. In this connection, they are aware of their responsibility in representing top management in interpreting policies.

Supervisors want training, and feel that training enables them to participate more effectively in management. Areas specified include: how to supervise, technical information, planning and decision making. All of these interests indicate a genuine concern on the part of supervisors to meet their problems of the coming year in the most effective way possible, and to assume fully in the true sense of the word their supervisory functions.

Goodyear and URW Sign Pact

Settlement Expected to Provide Pattern for Industry Pension-Insurance Plans

► Goodyear Tire and Rubber Co., Akron, Ohio, and the United Rubber Workers of America have signed a contract covering more than 23,000 production workers in 11 cities. The contract, which was ratified by union members on April 26, provides for liberalized pension and insurance benefits to Goodyear's production workers and their families as well as improvements in working conditions and supplemental unemployment benefits (SUB), current reports state.

Goodyear was the only company in the Big Four at which workers did not strike and it was believed that ratification of the Goodyear contract would lead to an early labor peace in the rubber industry. Strikers have been out at the U. S. Rubber Co. since midnight, April 9, and at the Firestone Tire and Rubber Co. and the B. F. Goodrich Co. since April 15. In the past, a settlement in one of the Big Four has been followed in a short time by similar settlements in the other three. At smaller companies, terms are sometimes modified, but the basic principles are usually the same. As of April 29, the more than 58,000 workers at these three companies had not returned to work and all three firms were still attempting to reach settlements with URW representatives.

Wages Not An Issue

Wages were not an issue in this strike. Negotiations on wages have tentatively been scheduled for July. Some sources believe the rubber union will await the outcome of negotiations in the steel industry, where current contracts expire on June 30.

According to reports, the Goodyear agreement provides that a worker become eligible for normal retirement at the age of 65 after 10 years of service. Pensions will be paid on the basis of $2.40 monthly for each year of service previous to January 1, 1959, and $2.50 monthly for each year of service after this date. Previously, a worker accumulated normal pension benefits at the rate of $1.80 monthly for each year of service up to 30 years.

The new system eliminates deductions because of Social Security benefits. For those who have been on pension since 1949, the rate has been increased from $1.80 to not less than $2.25 monthly for each year of service with no limit on the number of years used in computing the pension. A retired worker would get credit for every year he worked.

Disability Benefits

The company has also granted disability benefits of $4.80 a month for each year of service before January 1, 1959, and $5 monthly for each year of service afterwards. When a disabled worker becomes eligible for social security, conversion to a normal pension is made. He will be eligible for disability benefits after 15 years of service if he is unable to continue working for the company.

Early retirement benefits are another feature of the new contract. If an employee chooses to retire before reaching the age of 65, his pension will be reduced 4/10 of 1 per cent of each month prior to that time and will continue for the employee's lifetime. Early retirement at the company's request or by mutual agreement is provided on the basis of $4.80 monthly for each year of service before 1959 and $5 monthly afterwards. This type of pension would continue until the employee is eligible for Social Security, at which time the amounts would be adjusted to normal retirement benefits. Early retirement can come after 20 years of service at the age of 55.

The contract also provides "vested rights" for an employee who has reached the age of 40 and who has served for 10 years. The employee will be eligible for a pension from Goodyear when he has reached 65, although he may be working elsewhere. An option plan is available to an employee who wishes benefits to be paid to a survivor after his death.

Some of the main points under insurance provisions are: (1) A grievance procedure is provided for disputes involving benefits; (2) Limitations applicable to accidental death and dismemberment have been liberalized; (3) Upward adjustments have been made in some surgical allowances; and (4) Improved insurance benefits have been extended to all retirees and employees who left the company at the age of 65 since 1949.

Other Benefits Provided

Other benefits provided by the new contract are: (1) Liberalized vacation requirements for those laid off or who leave the company; (2) Local unions are permitted to negotiate the skilled trades program at the various Goodyear plants; (3) The ceiling on SUB payments has been raised from $25 to $30 monthly (in addition to state unemployment). The new company wide working agreement and the SUB plan run until April 15, 1961.

The industry strike, which involves 58,000 workers and is spread over 31 cities in 16 states, is the first under-

taken against three of the Big Four rubber companies at the same time. The last major walkout in the industry involved a 52 day strike against Goodyear in 1954, with that strike extending to Firestone Tire & Rubber Co. during the last two weeks.

The industry's biggest strike was initiated at the U. S. Rubber Co. at midnight, April 9, when the company's contract with the URW expired. Negotiations, underway since March 3, had failed to lead to a settlement and an estimated 26,000 U. S. Rubber employees in 11 states walked off their jobs. Workers at Goodrich, Firestone and Goodyear factories took strike votes and threatened to walk out at the expiration of their pacts. The vote at Akron locals was 9 to 1 in favor of going on strike. A union spokesman stated "Members are in much more of a fighting mood this year." As expected, workers at Goodrich and Firestone struck on April 15. Goodyear had already begun to reach a satisfactory agreement with the URW representatives and thus avoided a walkout. For a time, negotiations at the other three companies came to a standstill.

Firestone and Goodrich, whose negotiations began March 10, urged that talks continue on a day to day basis. A Firestone official said his company had "made a sincere effort to meet union demands consistent with the right to run our factories on a sound economic basis in a highly competitive industry." Firestone also issued a statement saying the URW walked out "after the union tentatively accepted from another company substantially the same terms we had offered." A union spokesman said the Firestone statement "just is not so."

Places Advertisements

Goodrich placed full page statements in the *Akron Beacon Journal* directed to URW members. The company listed 49 of what were termed "impossible" demands of the union and in another statement pointed out that strikes since 1949 had cost laborers $44 million in lost wages. In rebuttal, the union said its members had gained $6.69 in daily income from 1949 to the present making up the wage loss due to strikes in 95 working days. The union also declared that workers would not have made these gains without striking.

The Union's contract with the General Tire & Rubber Co. expired at midnight, April 30. There is said to be little prospect of a work stoppage as the union has not (at this writing) taken a strike vote. Negotiations are said to be continuing in Cleveland, Ohio, and one source predicts a speedy settlement.

Seiberling Rubber Co. came to terms with the URW hours before its contract expired on April 30. No details as to the Seiberling-URW pact have been announced as yet, but its terms should be close to the Goodyear pact.

Late Developments

► As this issue went to press, the URW and the U.S. Rubber Co. announced that a new contract had been signed on May 1. Some 26,000 company employees began an immediate return to their positions. According to spokesmen, a new five year contract to run to July 1, 1964, outlining a pension, insurance and severance pay program was drawn up by U.S. Rubber and the union. Also agreed on were two-year contracts to run to June 1, 1961, stipulating work rules and a rise to a new maximum of $30 per week from $25 a week in supplemental unemployment pay exclusive of any state or federal aid. There was no increase in the number of holidays, or decrease in the number of working hours in the contracts which must be ratified by union members before going into effect.

General Tire to Build Plant

► General Tire & Rubber Co., Akron, Ohio, has announced that it has selected Mayfield, Ky., as the site for its third domestic tire manufacturing plant. According to the company, Mayfield, located in southwest Kentucky, was chosen over 35 other locations because of its advantageous geographical access to growing tire markets of the midwest and central states and because of its abundant water, power and gas resources. Ground breaking for the factory, which will incorporate the rubber industry's most modern machinery and production design, is expected to take place in early March. Completion of construction and equipment installation is expected to be in May, 1960. The new plant, which will be built on an 80-acre tract, will initially have 400,000 square feet of floor space. It will be basically a one story, masonry construction providing a continuous flow production design.

Tube-Kote to Build Plant

► Tube-Kote Inc., Houston, Texas, has announced that construction will begin on the firm's new quarter million dollar pipe coating plant near Midland, Texas. According to the company, the new facilities will have the capacity to coat 10,000 feet of pipe per day. The company states that the new plant will serve the needs for oil field tubular coating for the Permian Basin with its particular problems of water floods, high pressure gas wells and both sweet and sour crudes. The internal coating of oil field tubular goods with Tube-Kote coatings prevent damage from galvanic and chemical corrosion and the cost of replacing drill pipe and tubing for these two reasons is reduced, the company stated.

Underwriters' Report on Hypalon

► Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has released a 63-page Underwriters' Laboratories report on the investigation of a Hypalon compound for Types RHW and RHH building wire. According to the company, the approval of Hypalon is of particular interest in that a single compound met the requirements for both types, and a single extrusion of the Hypalon compound served as both insulation and jacket. The Underwriters' investigation was conducted to determine the properties and characteristics of the synthetic rubber material for both insulation and jacket. Of particular concern were the long time aging properties of the material, together with its qualifications as an elastomer. The wire was subjected to all aging, flame and electrical tests normally applicable to the type designation using recognized insulation and jacket materials, and numerous other mechanical, thermal and electrical tests to note its over-all properties.

American Chemical Building Plant

► American Chemical Corp., jointly owned by Stauffer Chemical Co., New York, N. Y., and Richfield Oil Corp., San Francisco, Calif., has announced that it has begun construction of its $7,500,000 petrochemical plant at Watson, Calif., with completion scheduled for January, 1960. According to the company, the major products of the new petrochemical venture will include ethyl chloride, ethylene dichloride and vinyl chloride monomer. The company also plans to produce plastic polymers and copolymers as well as perchlorethylene and trichlorethylene.

Safety in Rubber Plants Considered at NSC Meeting

► National Safety Council has issued its booklet on the "1958 National Safety Congress Transactions" on the glass and ceramics, and rubber industries, which contains talks delivered on these topics at the National Safety Congress. The Rubber Section of the Council met on October 20 to 21 at the Conrad Hilton Hotel, Chicago, Ill. The meeting was opened by C. E. Beck (St. Clair Rubber), who acted as general chairman, and the first paper was delivered by L. E. Soderquist (McNeil Machine).

In a paper entitled "Engineering Safety into Manual and Automatic Curing Equipment", Mr. Soderquist discussed equipment presently used in the rubber industry and showed how safety features are incorporated into the equipment. Machinery described included the Bag-O-Matic; automatic unloading machinery; electrically operated mechanical goods presses; and ejection equipment. In engineering curing equipment for use in the rubber industry, Mr. Soderquist said, humidity conditions, high pressure steam, water and other services necessary for vulcanizing operations must be taken into consideration. Careless action of operating personnel must also be considered in the design of equipment.

Banbury Operation

"Safe Operation of Banbury Mixers" was presented by Alan S. McLeod (U.S. Rubber). After describing events that lead to the decision that a safety device was needed for the Banbury mixer, Mr. McLeod discussed the development of the Banbury temperature limiter. He described the temperature limiter as a sort of sprinkler head, geared to stop the Banbury only when temperatures high enough to cause danger of fire or explosion are reached.

Everett Perlberg (Adamson United) discussed "New Developments in Safety of Calenders and Tire Test Equipment." Mr. Perlberg opened his discussion by enumerating some of the dangers inherent in the testing of tires. He felt that the best protection of employees and expensive control equipment adjacent to the test wheel can be made by the installation of safety fences, interlocks and the use of common sense. He described some of the safety features designed into a calender by the U. S. Rubber Co. and the Adamson United Co. Increased safety is the joint responsibility of the machinery user and the machinery builder, Mr. Perlberg concluded.

The second session began with a paper entitled "The Problem Drinker and the Safety Program" by J. E. Laughlin (Firestone). Mr. Laughlin said that alcoholism costs industry and business millions of dollars. The problem drinker was described as a person whose excessive drinking repeatedly interferes with his health or personal relations and whose work is thereby reduced in efficiency and dependability. Mr. Laughlin enumerated methods of detecting the excessive drinker and the steps taken at Firestone to combat alcoholism.

Jean Sonnhalter (Firestone) presented "A Coordinated Safety Program from Top to Bottom." In this paper the author spoke on the efficacy of a coordinated safety program in rubber plants and the part played by the plant publication in this program.

"Pleasant Ways with Incentives", delivered by H. S. Fryberger, was devoted to the use of incentive awards in accident prevention programs. Mr. Freyberger felt that incentive awards are an effective means of dealing with the problem of safety. He then described a successful safety program based on the use of incentive awards.

In "Crusade for Safety", F. A. Burgner stated that every employee is a potential crusader, who must be sold on safety. This, he said, can come about only through proper communications. A successful program must focus its emphasis on the personal factor and the chain of communications must be strong from top management to the man on the job. Weekly contacts with supervision help keep this vital chain of communications strongly linked together, Mr. Burgner said.

The final paper "Safety Specifics", was presented by L. E. Dequine, Jr. (Chemstrand) who described the safety program at the Chemstrand Corp. Some of the successful safety measures discussed were a completely equipped medical section; employee safety effort with the presentation of awards; and training for safety. He stated that safety rules had been developed for the plant as a whole and for each of its operating areas. Another part of the safety program comprises comprehensive injury reports and investigation procedures on all in-plant injuries.

Goodrich-Gulf Unit in Operation

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has begun operations at new facilities at its Port Neches, Texas, plant for large volume production of a new synthetic cold rubber containing tiny particles of carbon black intimately and uniformly mixed with rubber molecules. Representing an investment of more than $1¼ million, the new equipment is designed to produce 15 million pounds of black masterbatch monthly on a continuous-flow basis. Half of styrene-butadiene copolymer reactor lines, with their recovery and drying equipment, at the Port Neches plant has been converted to this production.

The new product, known as "Ameripol Micro-Black" masterbatch, is said to give as much as 15 per cent more road life when used as tire tread and retread stock than present synthetic rubbers when the reinforcing agent is dry-mixed with the rubber in Banburys. In addition, Micro-Black's improved abrasion resistance offers wide possibilities for belting, insulation and molded and extruded products subjected to heavy duty service, Goodrich-Gulf states.

Rome Cable and Alcoa to Merge

► Shareholders of the Rome Cable Corp., Rome, N. Y., have ratified an agreement under which the Aluminum Co. of America, Pittsburgh, Penna., would acquire ownership of the company. When the transaction is completed, Rome Cable shareowners will receive six-tenths of one share of Alcoa common stock for each share of Rome Cable. The business would be continued at Rome under the Rome Cable name, as a subsidiary of Alcoa.

Form New Corporation

► Formation of a jointly owned corporation for the development of porous and microporous plastic materials suitable for wearing apparel and other end uses has been announced by the Electric Storage Battery Co., Philadelphia, Penna., and Reeves Brothers, Inc., New York, N. Y. The new firm, to be known as the ESB-Reeves Corp., incorporated in Delaware, will utilize the technology of ESB and Reeves in order to expand the development of plastic microporosity for new end uses.

Existing plants and facilities of the parent firms will be used to initiate the manufacture of new products. Reeves will produce in its own mills a line of apparel fabrics that will be waterproof while permitting the passage of moisture vapor through microscopic pores and ESB will continue to produce porous materials for storage batteries. Both companies will have equal representation on the board of directors of the new firm.

Georgia Marble Appointments

► Calcium Products Division of the Georgia Marble Co., Tate, Ga., has promoted Joseph C. Nelson, Jr., to assistant sales manager and has appointed two new sales representatives, James R. Thornwell and Thomas E. Evans. Mr. Nelson attended Davidson College and has been working as a sales representative for the Calcium Products Division since June, 1955. Mr. Thornwell is a graduate of Vanderbilt University and has been associated with the Calcium Products Division laboratory since April, 1957. Mr. Evans is a graduate of the University of Chattanooga and has been in the company's Geology Department since November, 1958.

Akron Group Hears Symposium On Inorganic Agents and Fillers

► Approximately 500 members and guests attended the technical meeting of the Akron Rubber Group on April 3, at the Sheraton Hotel in Akron, Ohio. The meeting was highlighted by a symposium on "Inorganic White Reinforcing Agents and Fillers." Following the symposium, the group had dinner and heard Dr. Arthur A. Schuck, chief executive of the Boy Scouts of America, discuss "Ideas and Ideals." During dinner the newly elected group officers for 1959-1960 were announced. The officers are: *Chairman*, Milton H. Leonard (Columbian Carbon); *Vice-Chairman*, Irvin J. Sjothun (Firestone); *Secretary*, John H. Gifford (Witco); and *Treasurer*, C. W. Stalker (General Tire).

The panel discussion was under the chairmanship of James W. Hostettler (General Tire). The first speaker, Victor H. Vodra (Rubbermaid), who spoke on "A Challenge to the Rubber Industry," pointed out that because of the growth in other phases of the rubber industry, the value of products sold for non-transportation uses exceeds that of tires and tubes; hence public demand for colored items is increasing. He stated that the time is rapidly approaching when rubber chemists will need to know non-black compounding as well as they now know black. Mr. Vodra surveyed the non-black and black fields and presented slides which showed the different types of non-blacks.

Panel members of the Akron Rubber Group's symposium on "Inorganic White Reinforcing Agents and Fillers." Left to right: Robert S. Havenhill (St. Joseph Lead), James W. Hostettler (General Tire), E. E. Whitted (Faultless), C. A. Carlton (J. M. Huber), Ralph F. Wolf (Columbia-Southern), and Victor H. Vodra (Rubbermaid).

Discusses Clays

The next panelist, C. A. Carlton (J. M. Huber), in discussing "Clays for the Rubber Industry," explained that the term "clay" covers the entire range of hydrated aluminum silicates from kaolin containing two moles of silica to one mole of alumina, to the bentonitic types containing 5-6 moles of silica to one of alumina. The kaolin type is the one of most interest to the rubber industry. He pointed out that the procedures necessary for a complete evaluation of a clay deposit depends on the end use of the clay in question. He made the following evaluations of clay for use in rubber: clean and dry cores; check brightness (color) on each sample; determine sieve residue on 200 and 325 mesh sieves; determine particle size distribution; determine water settling characteristics as a rough indication of particle size; pulverize to commercial specification and evaluate in rubber; and check for presence of copper and manganese.

Mr. Carlton went on to discuss mining techniques and the two basic methods, dry process and wet process, of processing the clay. He presented data on the chemical composition of kaolin clays and various clay test recipes, such as a comparison of hard and soft clay at four volume loadings in natural rubber, styrene-butadiene and neoprene; a comparison as regards modulus at 300 per cent elongation in the case of natural and at 400 per cent in the cases of SBR and CR; a comparison in Shore hardness; and a comparison in resistance to tear.

Ralph F. Wolf (Columbia-Southern), in his talk on "Silicas and Silicates," restricted his remarks to the manufactured products which, he explained, are true reinforcing materials. He said that reinforcing silicas are produced by two general types of processes, a wet process in which silica is precipitated from a solution of water soluble silicate, and the process by which silicas are produced thermally in dry form. Mr. Wolf presented, on slides, some of the similarities and differences between carbon black and a reinforcing silica; a comparison at various loadings in natural rubber; and a comparison at various loadings in SBR 1500. He concluded his talk with a discussion on the future of reinforcing silica and the part it will play in the production of colored tires.

"Whiting" was the subject of the talk presented by the next panelist, E. E. Whitted (Faultless). He stated that whiting, or calcium carbonate, is one of the oldest and most widely used fillers known to the rubber industry. Mr. Whitted pointed out that the popularity of the calcium carbonates can be laid mainly to two factors: first, its low cost; and second, that very high loadings can be used with no appreciable loss of softness, elongation and resilience. He then presented a short history of calcium carbonates, and presented data on the manufacture of the fillers as well as their physical properties.

The final speaker at the symposium, Robert S. Havenhill, discussed "Miscellaneous Reinforcing Agents and Fillers." In this group, he stated, there is zinc oxide, titanium dioxide, diatomaceous earth, mica, barytes and talc. He stressed that talc and mica are ground minerals which are used primarily as dusting agents because of their slippery and platey particle shape. Barytes, another ground material, is used as an inert filler where high specific gravity and acid resistance are required. Zinc oxide is made by burning zinc vapor in air and is used as a white pigment, reinforcing agent, activator and a vulcanizing agent in both milled rubber and latex. Mr. Havenhill also presented electrostatic contact potential theories of mixing and reinforcing along with suggested mechanisms for the activation of organic accelerators by zinc oxide.

1959 DuPont Catalog Released

► Elastomer Chemicals Department of E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., has issued the *1959 Catalog of DuPont Elastomers and Chemicals*. The booklet, which replaces the edition printed in November, 1957, contains descriptions of the products marketed by the Elastomer Chemicals Department. New products included in the booklet are Hypalon 30 synthetic rubber; Neoprene Type AD; Neoprene Type FB; Neoprene Type WB; Neoprene Latex Type 673; Conac s; DOTG; Diak No. 1; Diak No. 2; and Viton A-HV synthetic rubber.

Installs Radiation Unit

► Shell Chemical Corp., New York, N. Y., has installed a $100,000 radiation unit at its synthetic rubber research center at Torrance, Calif. The unit, called Hotrodder, has a cobalt-60 source, and will be used to study ways to improve rubber, plastics and radiation-resistant products for atomic power units, the company reports. Hotrodder has an iris source, which can be adjusted to give radiation flux ranging from $2x10^6$ to $7x10^7$ rads per hour, the company states.

1959-1960 Officers Elected By Ft. Wayne Rubber Group

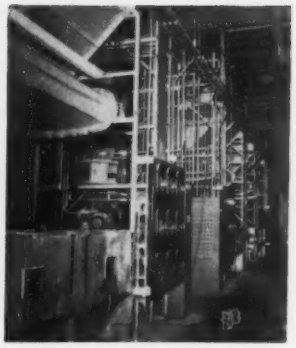
► The Fort Wayne Rubber & Plastics Group held its fourth meeting of the 1958-1959 season on April 16, at the Van Orman Hotel in Fort Wayne, Ind. The dinner-meeting was attended by 173 members and featured a talk by William E. Kile, of Merrill Lynch, Pierce, Fenner & Smith, on "Planning a Personal Investment Program." The results of the election for 1959-1960 group officers were announced during the meeting. The officers elected are: *Chairman,* Walton D. Wilson (R. T. Vanderbilt); *Vice-Chairman,* Allen Bluestein (Anaconda Wire & Cable); *Secretary-Treasurer,* A. L. Robinson (Harwick Standard); and *Directors,* Devon Wilson (General Tire), Art Brumfield (Belden Mfg.), Bob Lea (Thiokol) and Mel Whitfield (Naugatuck Chemical).

In discussing stock investing, the guest speaker, Mr. Kile, stated that the specific stock or bond is the last thing a person should think of when planning a personal investing program. He explained that the problem in an investment program does not lie with the security, it lies with the individual; with his ability to describe and define his own needs and aspirations. Mr. Kile pointed out that before selecting a stock, a person should think in terms of industries, and to try to find industries that are like one's self. He explained that if a person is young and has earning power, he should think about growth industries; if a person is mature, and still earning money, a mature industry should be the choice; if a person has no earning power, retired or widowed, industries well defended against losses should be the choice.

According to Mr. Kile, once the industry is selected, then comes the selection, with the help of a broker, of the specific stocks. The broker can tell which stocks his research department considers to have the best values and prices within the industry chosen. Mr. Kile stated than an intelligent investor is programmed for both boom and bust and he is prepared to accept change as the way of life—not trying to out-guess the economy from month to month. At the conclusion of Mr. Kile's talk, a film called "What Makes Us Tick?", from the New York Stock Exchange, was shown to the group.

Walker Named Representative

► Bonded Oil System, Inc., Boston, Mass., has announced the appointment of William B. Walker as sales representative in the Boston area for solvents and industrial oils. Mr. Walker joined Bonded Oil after serving for 25 years as sales representative for Esso Standard Oil Co. He was formerly associated with the Hood Rubber Co. as purchasing agent.



Installs Rubber Dryers

► Goodyear Tire & Rubber Co., Akron, Ohio, has completed an extensive expansion program at its synthetic rubber plant in Houston, Texas. The plant recently installed four gas-fired, 3-pass, synthetic rubber dryers which were designed, built and erected by C. G. Sargent's Sons Corp., Granitesville, Mass. The photograph above shows the discharge ends of the dryers.

Mobay Designs New Machine

► Mobay Chemical Co., Pittsburgh, Penna., has developed a new type of machine for the manufacture of urethane elastomer parts by a continuous casting method. In the company's laboratories at New Martinsville, West Va., where the casting machine was designed and developed, urethane elastomer parts weighing from four ounces to 96 pounds have been successfully cast on the machine. A simple, push button control panel is said to make it possible for one person to operate the machine and does away with extensive hand-mixing of urethane chemicals used in the process. According to Mobay, use of the machine permits precise control in blending the urethane chemicals and also results in a fast mass production system with built-in quality control features.

Kinoy Named Representative

► Jerome Kinoy Co., 360 S. Broadway, Yonkers, N. Y., has been appointed manufacturers representative by the Appleton Machine Co., Appleton, Wisc., makers of pulp and paper mill and packaging equipment. The Kinoy firm will represent Appleton in metropolitan New York and Long Island, handling Gilbert and Nash air guides, filled rolls and products of Appleton's Doven Division. Mr. Kinoy also represents the Rexford Paper Co., Milwaukee, Wisc., and Wilson Steel, Chicago, Ill.

Washington Group Hears White On Nitrile Silicone Rubber

► The Washington Rubber Group held a technical meeting on April 6, at the Army-Navy Club, Washington, D. C., at which approximately 60 members heard Burton B. White (General Electric) speak on "Nitrile Silicone Rubber." During the business meeting, the Nominating Committee submitted the following slate for officers for the year 1959-1960: *President,* A. W. Sloan (Atlantic Research); *Vice-President,* Philip Mitton (Corps of Engineers, USA) and G. G. Richey (National Bureau of Standards); *Secretary,* F. M. Van Etten (Bureau of Ships) and M. H. Wright (International U. S. Rubber); and *Treasurer,* J. R. Britt (B. F. Goodrich) and C. B. Wheeler (Goodyear).

At the technical meeting, Mr. White described the development of nitrile silicone rubber at General Electric. He explained that the basic dimethyl siloxane polymer and modifications of the polymer by replacement of methyl groups and phenyl groups exhibit excellent high and low temperature properties and superior resistance to ozone and oxygen. However, they are not resistant to swelling in certain classes of solvents, which include jet fuels and transmission fluids. Modification of polymers by the introduction of polar radicals, such as the cyano group, greatly reduces solubility of polymers in their similar solvents, he continued. He then pointed out that the per cent of swell at elevated temperatures is reduced to the levels found satisfactory in such applications as oil seals and O-rings. According to Mr. White, compromises for resistance to various solvents can be accomplished by varying the inol per cent of the polar group.

Stops Plastics Production

► General Electric Co., Schenectady, N. Y., has announced that it is leaving the plastics business. Its Plastics Department employs about 1,000 workers, including 450 in its Decatur, Ill., plant and the others at its plant in Taunton, Mass. The company has sold the Taunton plant to Haveg Industries. Haveg has arranged to buy most of the equipment and business of the Decatur plant, however G-E will retain the plant property.

Rosenbaum Named Representative

► Geigy Industrial Chemicals, Division of Geigy Chemical Corp., Ardsley, N. Y., has announced the appointment of Irwin M. Rosenbaum as technical sales representative for eastern Pennsylvania, Maryland, Delaware and the southeastern states. Mr. Rosenbaum graduated from Gettysburg College in 1954 with a B.A. degree in chemistry and joined Geigy Chemicals in 1957 following service in the U. S. Air Force.

No. Calif. Hears Nebeker; Tours Shell Development

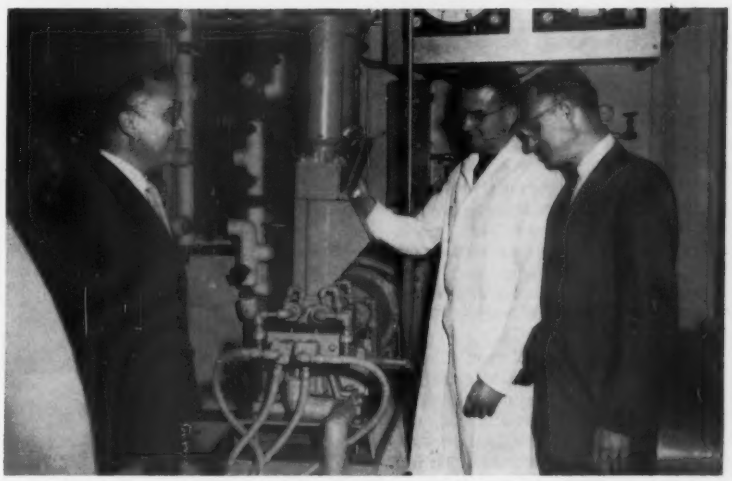
► The April 9 meeting of the Northern California Rubber Group consisted of a visit to the Shell Development Co., Emeryville, Calif., and a talk by H. R. Nebeker (Shell Chemical) on "Shell's Isoprene Rubber." The group held a dinner meeting prior to its visit to Shell at the Zombie Village in Emeryville. Immediately following the business portion of the meeting, the group adjourned to the new auditorium of Shell Development Co. and were welcomed by Dr. S. A. Ballard, director of chemical research. Dr. Ballard gave a brief description of the Shell organization and introduced the main speaker.

In his talk, Mr. Nebeker described the new polymer which has recently been the focal point of interest in the rubber industry. He stated that the uniform properties inherent in a synthetically produced material and the color characteristics of Shell's product will provide ideal raw material for use in various white and light colored rubber stocks. He explained that an ash forming material, which is equivalent to about 0.2 per cent calcium, is the only component of the rubber which is not normally present in rubber formutions inasmuch as the organic acid can be substituted for stearic acid in compounding recipes. This extremely low metallic content should, Mr. Nebeker felt, provide excellent electrical properties for use in such applications as insulating materials, battery separators, and the like.

Processing Stocks

In processing black reinforced stocks, according to the speaker, the comparatively low Mooney viscosity of the Shell polymer allows it to be charged directly to the Banbury mixer without the preplastication step normal with natural rubber. Mr. Nebeker presented data showing that in a typical tread stock formulation in which no additional stearic acid was added, the physical properties of the isoprene rubber stocks were nearly equal to those of natural rubber stocks. He compared isoprene rubber with natural rubber in carcass and breaker stocks.

Mr. Nebeker pointed out that in these applications the synthetic material nearly equals the physical properties of natural rubber. The modulus values for the synthetic stocks are generally lower than those of the control, but, according to the speaker, this slight difference is not important inasmuch as heat build-up characteristics of the two stocks are essentially equal. Following the talk, the group toured the Shell facilities including the Motor Laboratory, the Van de Graaff Accelerator, the Computer Installation, and the Rubber Testing Laboratory.



Left to right: H. R. Nebeker (Shell Chemical), principal speaker at the Northern California Rubber Group meeting, F. W. Morss (Shell Development) and C. C. Corkadel (Oliver Tire), NCRG vice-chairman, watch the operation of a small Banbury mixer during the NCRG visit to the Shell Development Co.

Socfin Executive Makes Tour

► Dr. Pierre Gyss, head of the Chemical Department of Socfin Co., Ltd., Hevea latex and rubber producers in Malaya, recently spent three weeks in the United States and Canada, during which time he visited the technical departments of users of "Soctex" latex and "Socfin" rubbers. While in America, Dr. Gyss gathered data to improve existing latices and rubbers and also to compare notes for further development and utilization of new latices in Far Eastern laboratories and estates. Low ammonia latices were extensively investigated.

On his return to Malaya, Dr. Gyss planned to stop at Cambodia and South Viet Nam to visit sister companies of Socfin. These companies produce Terres Rouges rubbers and latices. Dr. Gyss has been on the Far Eeastern rubber and palm oil plantation for more than ten years. He was educated in France and has carried on post graduate studies at Institut du Caoutchouc.

Allied Buys Harmon Colors

► Allied Chemical Corp., New York, N. Y., has announced that the company has completed negotiations with the B. F. Goodrich Co. whereby Allied Chemical will acquire the business and assets of Harmon Colors. Harmon will be operated as a separate unit of the company's National Aniline Division. Harmon Colors, a producer in the field of specialty organic pigments for 40 years, has been a part of the B. F. Goodrich Chemicals Division of the B. F. Goodrich Co. Headquarters, laboratories and manufacturing facilities of Harmon are located at Haledon, N. J.

Goodyear Promotes Two

► Ben M. Stephens, formerly manager of the Lincoln, Nebr., plant for the Goodyear Tire and Rubber Co., Akron, Ohio, has been named to succeed A. A. Teisher, as manager of the company's molded and extruded rubber and plastic products plant at St. Marys, Ohio. The appointment is effective July 1, when Mr. Teisher retires after 43 years of service. The company has also announced that Daniel R. Remigio, production superintendent for the rubber belting plant at Lincoln since 1956, has been promoted to plant manager there.

Mr. Stephens, who joined Goodyear as a college trainee in 1939, was appointed assistant superintendent of Goodyear's industrial products production at Akron in 1951 and promoted to Lincoln plant manager in 1955. Mr. Remigio joined Goodyear at Akron in 1946 as an hourly employee. He enrolled in the company's production training program in 1947 and served as a shift foreman and supervisor at Akron and Lincoln before he was named general foreman in 1953 and production superintendent in 1956.

Constructing New Tire Plant

► Pennsylvania Tire Co., Mansfield, Ohio, is building a tire plant at Tupelo, Miss., which is scheduled to be completed on August 15. Expected to cost about $500,000, the building will have about 147,000 square feet of floor space. It will be constructed of concrete and brick with provision for expansion. Most of the heavy equipment for the plant has already arrived at Tupelo and is being stored until the building is completed.

Jefferson Appointments Announced

► As part of a current expansion program, Jefferson Chemical Co. has created two new posts at its Port Neches, Texas, facility. R. Tesoro has been named assistant plant manager, operations, and R. H. Darling, assistant plant manager, engineering, construction and maintenance. Other personnel changes announced by the company involve E. R. Cobb, who succeeds Mr. Tesoro as chief processing engineer, and C. H. Moore, who has been appointed chief engineer for the Engineering and Maintenance Division, succeeding Mr. Darling.

Mr. Tesoro joined Jefferson Chemical in 1948 as a chemical engineer at Port Arthur, Texas; was named assistant chief engineer, process, at the Neches plant in 1954; and later became chief processing engineer. Mr. Darling has been with Jefferson Chemical since 1955, when he was appointed chief engineer at the Port Neches plant. Mr. Cobb joined the company in 1947 as a chemist and in 1956, he was named process group leader. Mr. Moore, who has been with Jefferson Chemical since 1949, most recently served in New York City as the company's engineering representative working with contracting engineering firms involved in Jefferson Chemical's expansion program.

American Cyanamid Names Hill

► American Cyanamid Co., New York, N. Y., has announced the appointment of Dr. A. G. Hill as manager of its Bound Brook, N. J., plant. Dr. Hill is a graduate of both Baylor and Yale Universities. He has been with Cyanamid since 1932, when he joined the company as a research and development chemist. In addition to other capacities, he has served the plant as resident technical director, manager of the Pharmaceutical Manufacturing Department and assistant plant manager. He is a member of the American Institute of Chemists, American Institute of Chemical Engineers, the American Chemical Society, the Society of Chemical Industry and the American Association for the Advancement of Science.

Clevite to Buy Walco

► Clevite Corp., Cleveland, Ohio, has announced that it has completed negotiations for the acquisition of Walco Products, Inc., East Orange, N. J. Also included in the acquisition are Walco's associated phonograph needle manufacturing companies, Electrovox Co., Inc., East Orange, N. J., and Precision Products, Inc., Puerto Rico. The purchase price was not announced. According to Clevite, the companies will become part of its Electronic Components Division and their products will be marketed under a Clevite-Walco label.

Walter E. Head

Promoted by Goodrich

► B. F. Goodrich Tire Co., a division of the B. F. Goodrich Co., Akron, Ohio, has appointed Walter E. Head as vice-president for manufacturing succeeding G. E. Gulick, who has retired. Mr. Head, who was formerly manager of manufacturing, joined Goodrich as a tire builder in 1924. Later, he became an industrial engineer and manager of the Industrial Engineering Department in the Akron plant of the Tire Division. Transferred to California in 1939 as production superintendent of the Los Angeles plant, he was named factory manager there in 1942. In 1945, he was appointed manager of the newly built Miami, Okla., plant and held that position until he returned to Akron as manager of manufacturing in 1957.

Spalding Merger Approved

► Federal Trade Commission hearing examiner, Albert E. Lipscomb, has issued an order which would dismiss charges that the acquisition of Rawlings Manufacturing Co. by A. G. Spalding & Bros., Inc., Chicopee, Mass., violated the anti-merger law. He maintained that the evidence did not establish that the effect of the acquisition might be to lessen competition or to create a monopoly in violation of Section 7 of the Clayton Act. The decision was not final and may be appealed, stayed or docketed for review. Spalding purchased Rawlings on December 8, 1955, for about $5.7 million and the FTC's complaint challenging the acquisition was issued the same day.

Champion Rubber Plant Burns

► A fire which apparently started on a loading dock on April 15 destroyed the Champion Rubber Co. plant at Barberton, Ohio, according to current reports. The plant's 30 employees escaped without injury as the flames spread rapidly throughout the two-story metal structure. There was no estimate of damage.

Bellanca to Sell Akron Holdings

► Bellanca Corp., Akron, Ohio, plans to dispose of all its Akron holdings by June 30, according to William H. Brockman, head of the management group that took over the firm last June. Since the inventory of used rubber and plastic machinery in Akron is the major portion of the firm's assets, management is making every effort to sell the equipment for the greatest amount. Holub Iron and Steel Co., Akron, Ohio, will handle the liquidation by the sale of individual machines and by sale of the remainder for scrap steel. It may be necessary to hold an auction sale of all unsold items in order to complete the program by mid-year.

Bellanca directors have also decided to exercise an option to buy General Development Corp., Elkton, Md., in exchange for 4,000 shares of Bellanca common stock. General Development is engaged in research, development and the manufacture of lighter-than-air products. In the transaction, Bellanca agreed to pledge sufficient collateral to support a line of credit of $150,000.

Litchfield Trusts Disclosed

► Paul Weeks Litchfield, honorary chairman of the board for the Goodyear Tire and Rubber Co., Akron, Ohio, established two charitable trusts totaling more than $1 million during his lifetime, current reports state. The trusts are separate from the Estate of Mr. Litchfield, who died on March 18. The Paul W. Litchfield Charitable Trust contains $650,000 and the Paul W. Litchfield Foundation $400,000. Five beneficiaries will receive equal shares in the Charitable Trust. These are Children's Hospital, Akron Area Council of the Boy Scouts, University of Akron, the Church of Our Saviour and Massachusetts Institute of Technology. Neither the purposes or the trustees of the Litchfield Foundation have been announced.

Esso Petrochemical Plant Opens

► Esso Petroleum Co., Ltd., has opened a new petrochemical plant at Fawley, Hampshire, England, having a capacity of 118,000 tons of chemical raw materials a year. Ethylene and butadiene are the two principal products of the new plant. The ethylene produced will be converted into polyethylene and ethylene glycol at two adjacent factories which are now under construction. The output of butadiene is being utilized by the new synthetic rubber plant of International Synthetic Rubber Co., Ltd., at Hythe, Southampton (see RUBBER AGE, Feb., 1959, pp. 818-20). Other products of the new plant include sulfur and a range of chemicals known as heptenes.

DuPont Develops LD-213 Liquid Urethane Elastomer

► Development of a new liquid urethane elastomer that forms products with extreme hardness in combination with exceptional resistance to impact and abrasion has been announced by E. I. du Pont de Nemours and Co., Inc., Wilmington, Del. The new product, designated "LD-213 Urethane Rubber," is one of a family of urethane elastomers based on polytetramethylene ether glycol and "Hylene" organic isocyanates which offer a broad range of properties. The other developmental products in the series—"Adiprene L Urethan Rubber" and "LD-167" have undergone testing and evaluation and are now in use by the rubber industry.

Like its predecessors, LD-213 is best compounded chemically rather than by the physical methods used for conventional rubbers. This allows wide variation in properties and, in many cases, permits emphasis on a specific desired property without sacrifices in others. LD-213 yields unusually hard vulcanizates with the advantages of elastomers as well as properties which so nearly approach those of some plastic resins that it has been termed an "elasto-plastic" by researchers. In properties, the new material is intermediate between hard elastomers and structural plastics such as nylon. Shore D hardness ranging upward from 50 to 80 combined with 250 per cent elongation at break and very high impact resistance suggest that this material may find application in fields where plastics have not been adequate.

Tensile and Tear Strength

Tensile strength and tear strength are high, and impact resistance readings, using the notched Izod test, can run as high as 9 to 10 foot-pounds per inch. Resistance to deformation is good and flexural modulus is very high. The material can be compounded to give very high energy absorption. A particularly interesting feature of urethane elastomers is resistance to effects of radiation. In addition, oxygen and ozone appear to have little degrading effect.

LD-213 urethane rubber has good resistance to heat at temperatures as high as 250° F., and resists deterioration by most oils, the company states. The new type of Adiprene can be processed as a liquid on the same commercially available equipment as is used for Adiprene L and LD-167. Applications under investigation in which LD-213 shows promise include shock resistant coatings, railroad car draft gear, automotive ball joint bearings, gears, heel lifts, and large industrial tires. The two other types of Adiprene are already in commercial use for smaller industrial tires.

Properties of Formulations of the Urethane Elastomers

	Adiprene	LD-167	LD-213
100 per cent modulus, pounds per sq. in.	1,000	1,900	3,500
Tensile strength, pounds per sq. in.	4,500	4,500	7,500**
Elongation, per cent	450	350	280
Hardness, Shore A	90	95	99
Hardness, Shore D	42	50	78
Tear strength, D-470 pounds per linear in.	60	150	190
Compression set, Method A, per cent (22 hr./70 degrees C. 1,350 psi)	7	8	40
Flexural Modulus, pounds per sq. in.	8,000	15,000	90,000
Impact Resistance, Notched Izod, foot pounds per in.	F	F	6
Bureau of Standards Abrasion Index	175	275	380

Rubber Trends Quarterly

► The main factors affecting the supply and consumption of both natural and synthetic rubber are analyzed in a quarterly bulletin called *Rubber Trends*, which is prepared and edited in London by the Economist Intelligence Unit, Ltd. The bulletin includes analysis and research conducted in London and supplemented by reports from expert correspondents in the world's key producing and consuming areas. Trends in the United States are followed by the firm's American associate, Warren S. Lockwood, Inc., New York, N. Y.

Rubber Trends is available through the Economist Intelligence Unit, Ltd., 22 Ryder Street, St. James', London, S. W. 1, England; or from its North American representative, Warren S. Lockwood, Inc., Lincoln Building, 60 East 42nd. St., New York 17, N. Y. The annual subscription rate is £30 (U. S. $90). including airmail postage.

Okonite Names Woodcock

► Okonite Co., Passaic, N. J., has announced the appointment of Tice B. Woodcock as purchasing agent and John L. Fabiny as assistant purchasing agent. The company has also announced that Kenneth T. Gordon, director of purchases, has resigned in order to enter another field of activity. Mr. Woodcock previously served with the U. S. Rubber Co. and Standard Air Conditioning Co. He joined Okonite in 1946 as a buyer and became assistant to the director of purchases in 1956. Mr. Fabiny began his career at the Hazard Insulated Wire Works Division in 1925 and transferred to Okonite's Purchasing Department in 1946.

Named Elastomeric Section Head

► Ralph Reiter, chemist, has been named head of the elastomeric section of the Resin Research Laboratories in Newark, N. J. Mr. Reiter, who has had eight years of extensive research experience in high heat resistant resins and polymers, will supervise all contracted research projects in the rubber, latex and foam rubber fields.

Patclin Develops Cleaner

► Patclin Chemical Co., Inc., Yonkers, N. Y., has announced the development of a stripper-cleaner for the removal of baked on carbon, latex and foam rubber from aluminum molds. According to the company, the product, "Patclin No. 918", may be used either concentrated or diluted with up to three parts of water, and may be used either hot or cold. The dilution and temperature in the use of Patclin No. 918 depends upon the type and amount of build-up on the mold and the speed of strip cleaning desired. The cleaner leaves the mold clean and free of residue, the company states. Acid based, Patclin No. 918 is used hot in a stainless steel tank and cold in a ceramic crock. It is shipped in 13 gallon carboys or in 55 gallon stainless steel returnable drums, according to the company.

Goodyear Develops Vitafilm F

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced the development of an extruded, plasticized polyvinyl chloride film. According to the company, it is the first such film to be approved for food packaging by the Pure Food and Drug Administration, and offered on a commercial basis. The company states that the product, called "Vitafilm F," measures one mil and is being produced in volume with a manufacturer's price of 73 cents per pound. Its yield is 21,500 square inches per pound. According to Goodyear, the film can be utilized either in straight or overwrap applications, and readily laminates to paper, film or foil to produce special pouch-type packages.

Neville Appoints Isenberg

► E. Glenn Isenberg has been named general sales manager of the Neville Chemical Co., Pittsburgh, Penna., in which capacity he will take over the duties of Alan S. Evans, Jr., who recently resigned as vice-president. Mr. Isenberg started with the company 22 years ago in the Traffic Department and later was promoted to assistant sales manager and then sales manager.

Rubbermaid Elects Two

► Rubbermaid Inc. has announced the election of two new vice-presidents, E. J. Fredericks and L. E. Gigax, to head its sales and manufacturing operations, respectively. Mr. Fredericks, previously director of marketing, is a graduate of Paterson State College and did post-graduate work in marketing at Paterson Business College. He joined Rubbermaid in 1956 as assistant sales manager of the Automotive Division, following service with the Bessemer-Stanton Corp., where he was general manager. In 1957, he was named assistant sales manager of the Housewares Division, and became director of marketing in 1958. He is a director of Rubbermaid (Canada) Ltd., a subsidiary company, and a member of the Canton (Ohio) Sales Executives' Club.

Mr. Gigax is a graduate of Purdue University and joined Rubbermaid in 1951 as assistant plant engineer. He previously worked for General Electric as a quality engineer at its Mahoning Glass Works in Niles, Ohio. In 1957, he was named factory manager of Rubbermaid. He is a vice-president and board member of Jamestown Finishes, Inc., a Rubbermaid subsidiary in Jamestown, N. Y. Mr. Gigax is a member of the Cleveland Chapter, Society for Advancement of Management; Akron Chapter, Society of Plastics Engineers; and the Akron Rubber Group.

Mobay Appoints Saunders

► J. H. Saunders has been appointed director of research for the Mobay Chemical Co., Pittsburgh, Penna., succeeding E. E. Hardy. Both Dr. Hardy and Dr. Saunders were formerly with the Monsanto Chemical Co. and joined Mobay shortly after it was formed in July, 1957. Dr. Saunders, who has been assistant director of research since that time, received his Ph.D. in organic chemistry from the University of Illinois in 1946. Dr. Hardy, director of research at Mobay since 1954, has accepted a position with Monsanto's Plastics Division, where he will be an associate in the Development Department.

Corduroy Adds New Tire

► Corduroy Rubber Co., Grand Rapids, Mich., has announced the addition of a new 15 inch tire to its Deluxe line. This new tire, according to Corduroy, offers nearly three times the non-skid edges of ordinary tires with each edge and angle of the reversed action traction tread scientifically designed to increase stopping power regardless of road conditions. The newly designed tire, formerly available in only 14 inch sizes, is offered in both nylon and super rayon cord, in tube or tubeless construction, and with either black or white sidewalls.

Carbon Black and Rain

► The U. S. Naval Weather Service has announced the development of a new technique for influencing the weather over limited areas by "seeding" the skies, from a plane, with carbon black. Clouds already in existence can be eliminated by the same method. Dry ice or silveriodide crystals have previously been used in rain making experiments. A rain making experiment, using carbon black, was conducted over the coast of Georgia recently. The Naval Weather Service sprinkled carbon black on seven clouds which dissipated in 2½ to 20 minutes. The experimenters then produced three single clouds and a line of clouds at a different level of the atmosphere. Naval scientists are using the results of the experiment to determine whether this carbon black operation can be used to disperse fog and possibly eliminate tornadoes and hurricanes.

Cadillac Moves Office

► Cadillac Associates, Inc., has moved to larger quarters at 29 E. Madison Building, Chicago, Ill. The new quarters are air conditioned throughout and have a modern, pleasant decor. Established 36 years ago, Cadillac operates on a nationwide basis out of Chicago. Personnel includes sixty-two active consultants, each a specialist in his trade line who has been drawn directly from the industry he represents. This insures selection of candidates based on actual knowledge of the functions and abilities required. Facilities are also provided for out-of-town employers to interview candidates. The rubber and plastics industries are represented by Clem D. Easly, who has had 40 years experience in rubber manufacturing and sales and who has also served with the Rubber Manufacturers Association.

Morton Joins Editorial Board

► Dr. Maurice Morton, director of the Institute of Rubber Research at the University of Arkansas, has been appointed to the editorial board of the new publication "Journal of Applied Polymer Science". The magazine, soon to be published, will become the medium for reports of scientific investigations in the properties and behavior of technically important and useful substances. Dr. Morton joined the University of Arkansas staff in 1948 as assistant director of rubber research. In 1953 he was appointed professor of polymer chemistry and was named director of rubber research in 1954.

OTS Issues Two Reports

► Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., has issued two new reports, the first of which is entitled *Development and Evaluation of Waterproof Two-Way Stretch Laminated Fabrics*, by R. Briganti and P. Sylvia, Jr. (U. S. Navy Clothing and Textile Office). This report describes a newly developed two-way stretch, waterproof fabrics which is reportedly suitable for swim or rescue suits in cold-water areas. Designated Order PB 151034, the 22 page volume was published in April, 1958, and is priced at 75c.

Evaluation of Fungicidal Vinyl Coated Cotton Duck, by J. K. Frederick, Jr., R. E. Otto and D. H. Pfister (Lowell Technological Institute Research Foundation for the Wright Air Development Center, U. S. Air Force), was published in June, 1958, contains 58 pages and is priced at $1.50. Order PB 151464 describes numerous physical and chemical tests which were made concerning eight-ounce fungicidal, vinyl-coated, cotton duck fabrics to determine the usefulness of these materials in military applications. The report also contains information and supporting data on selected measurable characteristics on which standards of acceptability can be determined.

Thiokol Unveils Rocket Engine

► Thiokol Chemical Corp., Trenton, N. J., unveiled its X-15 rocket engine at the annual meeting, which was held recently. Developed by Thiokol's affiliate, Reaction Motors, the engine is expected to be put in a North American Aviation Corp. plane this year, which will propel the first manned flight into space. A spokesman said that the speed of the plane will exceed 4,000 miles an hour. The engine is said to have the equivalent of 500,000 horsepower and will be the first rocket motor controllable by the pilot as well as the first to correct its own malfunction. During the meeting, Thiokol stockholders approved an increase in authorized shares from 2,000,000 to 6,000,000. With this action, a three-for-one split in the stock will take place on April 30.

Williams Joins Gross

► Ralph O. Williams has joined the sales staff of A. Gross & Co., New York, N. Y., manufacturers of fatty acids and glycerides. Mr. Williams will make his headquarters in Charlotte, N. C., and will handle sales and technical service for the company in North and South Carolina, Virginia and eastern Tennessee. He has a B.S. degree in chemistry from Lenoir Rhyne College and a B.S. degree in chemical engineering from North Carolina State College. Mr. Williams has most recently been plant manager of the Wica Co., Charlotte, N. C.

General Tire Names Two Directors

► General Tire and Rubber Co., Akron, Ohio, has announced that John E. Powers and Arthur H. Rude have been elected to fill the vacancies on the firm's 17 man board of directors. Mr. Powers is vice-president in charge of General Tire's plastics operations and Mr. Rude is executive vice-president of Aerojet General Corp., a subsidiary. They will serve out the unexpired terms of W. E. Fouse, co-founder of the company who died last July 22, and B. E. Smith who resigned recently. The names of Mr. Powers and Mr. Rude were submitted along with those of other directors for election at the annual stockholders meeting, Apr. 17.

A native of Worcester, Mass., Mr. Powers entered the rubber industry in 1925 following graduation from Harvard University. He joined General Tire in 1934 as a sales representative and went to Akron as a member of the tire sales executive staff in 1944. He was named manager of automobile tire sales in 1946, trade sales manager in 1951 and was appointed to his present post in 1953. Mr. Rude has been associated with General Tire or its subsidiary since 1919. He became vice-president of Aerojet in 1944 and executive vice-president five years later.

Develops Magnetic Plastic

► B. F. Goodrich Co., Akron, Ohio, has announced the development of a flexible magnetic plastic material that reacts just as metal or ceramic magnets. The material is made of Koroseal vinyl plastic which has been impregnated with a powder sensitive to magnetism. The company reports that its magnetism is permanent for all practical purposes. The material can be produced in continuous lengths in an unlimited variety of shapes ranging in size from that of spaghetti to garden hose. Goodrich reports that its Plastic Products Division at Marietta, Ohio, is producing the material at a rate of more than ten miles a week for use in gasket seals for refrigerator doors. The flexible strip can be magnetized in any direction, so that it attracts metal throughout its length, the company said.

Nuodex Names Representative

► Nuodex Products Co., a Division of Heyden Newport Chemical Corp., New York, N. Y., has appointed Daniel W. Klohs as technical sales representative for the company's Vinyl Additive Division. Before he joined Nuodex, Mr. Klohs was chief chemist at Pioneer Latex and Chemical Corp., and was instrumental in developing organosol formulations for coating fiber glass products and cotton fabrics used in the lampshade industry. He received his A.B. degree from Drew University and completed graduate work in organic chemistry at Columbia University. During World War II, Mr. Klohs served three years as an officer in the U. S. Navy.

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Rubber Technology Courses

► National College of Rubber Technology, London, England, will conduct four short courses during the summer which will be of interest to members of the rubber industry. The first, which was to have begun on April 29, is on the topic "Analysis of Plastics." The course consists of six lectures on the application of recent developments in analytical techniques for plastics. To be conducted from July 6 to 15, "Fundamentals of Polymerization Processes," for non-specialists, is intended to give an introduction to the basic principles of polymerization processes.

"Basic Rubber Technology for Sales, Buying, Costing and Planning Staff", will also be held from July 6 to 15. Lectures, discussions, demonstrations and practical exercises have been designed to give broader knowledge of basic rubber technology to staff members of the sales, buying, costing, planning and similar departments of firms engaged in the rubber and allied industries. "Basic Plastics Processing" will be conducted from July 15 to 24 and will consist of lectures and practical work on various processing methods. Further information may be obtained by writing to The Head, National College of Rubber Technology, Northern Polytechnic, Holloway Road, London, N.7, England.

General Tire Builds Test Track

► General Tire and Rubber Co., Akron, Ohio, is constructing a giant, 8½ mile test track near Uvalde, Texas, which, the company states, will be the largest of its kind in the world. To be completed by September 1, cost of the two-lane oval will exceed $400,000. The track, which was designed by General's Central Engineering Division, will have one-mile radius turns and straightways of about a mile. The roadway will be 44 feet wide with an eight inch base and a top surface of rock asphalt. Designed primarily for testing automobile tires, the outer lane will be banked to meet speed requirements. Included at the Uvalde site will be a 3,000 square foot office building and an 8,000 square foot garage for the auto and truck fleet.

Hercules Forms New Division

► Hercules Powder Co., Wilmington, Del., has announced the formation of a new applications group, to be known as the Plastics and Elastomers Division. The new division, located at the company's Research Center in Wilmington, will be headed by John R. Lewis. Mr. Lewis joined Hercules in 1942 as a chemist, and, with the exception of several years at an ordnance plant, has been at the Research Center since that time. He was named a research chemist in 1945, and a technical service supervisor in the Naval Stores Division in 1955.

Hans E. Beucken

Establishes New Firm

► Hans E. Beucken, formerly assistant vice-president of the Extruder Division for the National Rubber Machinery Co., has established his own business in Los Angeles, Calif., as a manufacturer's representative and engineering consultant. The new firm will be called the Hans E. Beucken Co. In his new organization, Mr. Beucken will also continue to represent NRM, promoting rubber and plastics extruders sales for the company in the states of California, Washington, Oregon, Arizona and Nevada.

Seivard Named Director

► Dr. L. L. Seivard has been named director of research, organic pigments, for the Pigments Division of American Cyanamid Co., New York, N. Y. Dr. Seivard has been with Cyanamid since 1952, when he joined the company's Bound Brook, N. J., plant as a development chemist. He became chief chemist for the Organic Pigments Manufacturing Department in 1957. Dr. Seivard is a graduate of Princeton University and of the Carnegie Institute of Technology. Before joining Cyanamid, he was associated with DuPont and Shell Chemical Co. He is a member of the American Chemical Society.

Cycolac Made in Standard Colors

► Marbon Chemical Division of the Borg-Warner Corp., Washington, West Va., has announced that Cycolac is now being offered in standard colors. Available from stock for immediate shipment, these colors were chosen for their popularity and appeal. The new standard colors are natural (non-pigmented), white, appliance white, dark grey, light grey, black, blue, red, yellow, tan and green. Colors other than those listed are also available, but are classified as either custom or premium colors.

Firestone Steel Cord Tire

► Firestone Tire & Rubber Co., Akron, Ohio, has announced the availability of its new steel cord, one ply truck tire that is reported to give up to twice the original mileage on drive wheels as compared to tires of textile cord construction. Firestone reports that the new tire, "Steelcord W-2", operates up to 100° cooler; provides 25 per cent reduction in power loss; has load-carrying capacity equal to extra ply rating textile tires; better traction because of larger and longer "footprint"; softer ride to reduce equipment maintenance costs; and provides greatly increased resistance to impact and punctures. According to Firestone, the W-2 Steelcord has only one ply, running at a zero angle—straight from bead to bead—and the running area is fortified with up to five bands of steel cords in the crown area. The company claims that these five bands of steel restrict tread movement; increase tread life; improve traction; reduce power loss and tire running temperatures; and prolong the original tire life, permitting many additional retreads. The tire is available in four sizes: 8.25-20, 9.00-20, 10.00-20 and 10.00-22.

Rubber Equipment Lease Plan

► Nationwide Leasing Co., Chicago, Ill., has announced a special package lease plan for the rubber industry under which any combination of equipment may be considered one package and leased as a unit for three to five years. According to the company, the package lease permits large and small firms to acquire $10,000, $25,000, $50,000 or more in equipment without capital investment. Nationwide states that under the lease, a rubber company could lease $10,000 worth of equipment for three years for a monthly rental payment of $320. The $25,000 package lease would cost $800 monthly for three years or $625 monthly for four years. A $50,000 lease features three, four and five year terms, three year leases costing $1,600 monthly; four years, $1,250; and five years, $1,050.

Gates Builds New Plant

► Gates Rubber Co., Denver, Colo., has begun construction of a $9 million plant at Nashville, Tenn., for the production of tires and retread materials. The building will have more than half a million square feet of floor space. To be located on a 155 acre plot on the Cumberland River, it is hoped that the plant will be in production by January 1, 1960. Initially, Gates will employ 250, but when the factory reaches planned production the payroll is expected to reach 2,000. The plant will produce tires and retread materials at the start and other products are expected to be added at a later date.

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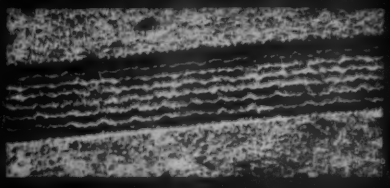
to here 

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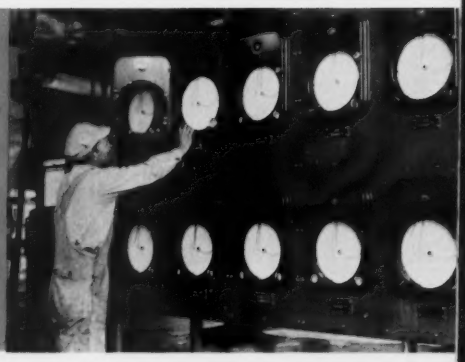

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STATEX 93 HMF High Modulus Furnace
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Linde Appoints Behnke

► Linde Co., Division of Union Carbide Corp., New York, N. Y., has announced the appointment of E. R. Behnke as manager of molecular sieve products. Formerly sales manager for these new products, Mr. Behnke now has the responsibility for their sales, production and technical development, and has headquarters at the firm's New Products Laboratory, Tonawanda, N. Y. According to the company, the molecular sieves are used industrially in petroleum refining, chemicals manufacture and metal processing, especially in the purification and drying of process streams, and they are also widely used in the curing of rubber and plastic materials.

Mr. Behnke joined the Linde Company in 1941 at Los Angeles after receiving his degree in mechanical engineering at the University of Wisconsin. From 1943 to 1946, he served with the U. S. Navy and participated in the refloating of the French liner *Normandie*, which burned and capsized at its New York pier. After the war, Mr. Behnke returned to Linde's Flame and Arc Process Laboratories at Newark, N. J., where he held the position of laboratory supervisor, assistant to the superintendent, and manager of engineering service. He solds several patents on electric welding and gas regulation apparatus.

Henley Develops Accelerator

► Henley & Co., Inc., New York, N. Y., has introduced a new accelerator, zinc pentamethylene dithiocarbamate, which is reported to give greater ease in latex processing. According to the company, the product, "Henley ZPD," gives a wide margin of safety in curing time as well as a more extensive vulcanization plateau, producing better modulus and tensile strength. The company claims that ZPD does not discolor compounds and consequently can be used with perfect safety in transparent and light colored stocks. ZPD is easily dispersed and ideal for all types of latex which require a water insoluble accelerator; it has little or no thickening effect on stored compounded latices; and gives fast cures allied with good aging stocks, the company states.

Increasing Polyethylene Capacity

► National Distillers and Chemical Corp. has announced plans to double the capacity of its Houston, Texas, polyethylene plant. Recently placed in production, the plant now produces 75 million pounds, and by the third quarter of 1960, is expected to produce 150 million pounds of polyethylene annually, bringing the company's total capacity to 250 million pounds. Officials said the plastic to be turned out at the Houston plant will be of the low density and medium density variety.

Dr. Hans Mueller

Plans Study of Redox System

► Dr. Hans Mueller, professor of chemistry at the University of Illinois, will spend his sabbatical year in Munich, Germany, where he will work with Professor Patat, an authority on polymerization reactions. The topic of their research will be the Redox System $S_2O_8'' + 2\ S_2O_3'' = 2SO_4 + S_4O_6''$ as an Initiator for Polymerization Reactions. Dr. Mueller will leave the United States on June 5 and will return by September 1960.

Thiokol Considers Merger

► Thiokol Chemical Corp., Trenton, N. J., and the Marquardt Aircraft Co., Van Nuys, Calif., have announced that preliminary talks aimed at the negotiation of a merger are now underway. According to the firms, discussions are still in the early stages and have not reached the point of establishing terms or clearance with the military establishment and other regulatory agencies. Thiokol is a major producer of solid-propellant rocket motors and chemicals for industry. Marquardt produces supersonic ramjet engines and is also engaged in high altitude rocket research, weapons support systems and controls and necessary systems for air and space projects.

Snell Consulting Service

► The Elastomer Section of Foster D. Snell, Inc., New York, N. Y., has announced a new consulting service to rubber compounders and the rubber industry. It is reported that the service will provide the subscriber with a series of 12 monthly reports on the compounding of new rubber chemicals such as resins, filler, accelerators, and antiozanants in five elastomers — natural, SBR, neoprene, nitrile and butyl. According to the company, this new product evaluation service is based on objective laboratory compounding and testing and does not duplicate the technical data supplied by the manufacturers of rubber chemicals.

Union Tank Corporate Change

► Union Tank Car Co., Chicago, Ill., has announced that the Graver Tank and Manufacturing Co., Inc., East Chicago, Ind., previously a subsidiary, became a division of the company on January 1. The change was made to simplify the company's corporate structure and is in accordance with similar action taken in the cases of other recent acquisitions. According to the company, there will be no basic change in the policy or method of operation of Graver Tank as a division of Union Tank Car.

Clark Root will continue as president and chief executive officer of Graver Tank and all other operating officials will remain in their present positions. The company has also announced that Graver Tank is currently fabricating and erecting a new Union Dome at Wood River, Ill., to serve as a modern repair and maintenance plant for the parent firm. Construction of the Wood River plant will be identical to the 384-foot diameter Union Dome, said to be the world's largest circular building without internal supports, which Union Tank Car recently completed at Baton Rouge, La.

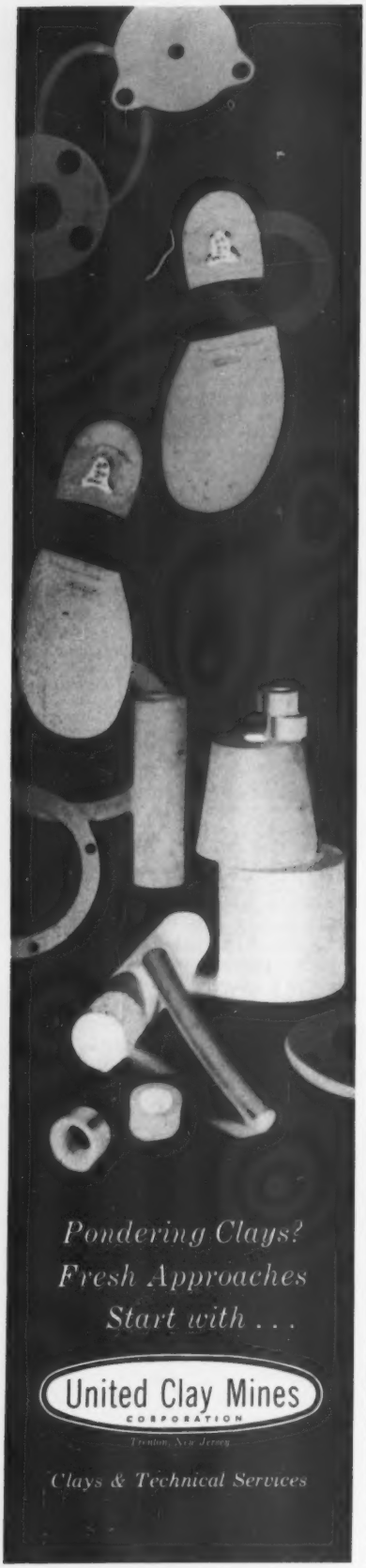
Sells Warwick Wax Unit

► Sun Chemical Corp., Long Island City, N. Y., has sold its Warwick Wax Division for an undisclosed amount of cash to Western Petrochemical Corp., New York, N. Y., a company formed to market a number of waxes. The division, which makes paraffin and wax additives, was sold because it did not fit into Sun's future plans and because its plant, in Chanute, Kansas, was not easily integrated into its geographical setup, a company spokesman said.

The remainder of Sun's divisions make paints, inks, textile chemicals, electric insulation and plastic laminates. Sale of the $3 million sales division will be counterbalanced largely by the Ampruf Division, which the company acquired last month. This division makes specialty paints and currently has an annual sales rate of more than $2 million, according to Sun.

Cooper Tire Files Offering

► Cooper Tire and Rubber Co., Findlay, Ohio, has filed a registration statement with the Securities and Exchange Commission for $3,500,000 of senior sinking fund debentures (with warrants) to be offered for public sale at par. The underwriting group will be headed by Paine, Webber, Jackson & Curtis and Prescott, Shepard & Co., Inc. Interest rate and underwriting terms as well as terms of the warrants will be announced later. Most of the proceeds will be used to retire a loan of $2,150,000 used for construction, the company states.



Imperial Rubber Buys New Plant

► Imperial Rubber Manufacturing Co., Inc., Hackettstown, N. J., has acquired a new, modern and larger plant with an annual production capacity of eight million pounds of tread rubber. The firm has also announced the exclusive use of special material in its rubber tread which makes unnecessary the use of mold lubricant, thereby eliminating the need for mold cleaning. Two No. 11 Banbury mixers and related equipment are being installed in the plant's 19,000 square feet of floor space. One mixer will be used exclusively for tread rubber and the other for the company's new chemically crosslinked polyethylene compounds.

James Cooke, president of Imperial Rubber, is directing the expansion program. When completed, the new plant's daily capacity will be 25,000 pounds of tread rubber and 25,000 pounds of polyethylene compounds, according to Mr. Cooke. Limited production quantities of both products are immediately available through present facilities. Provisions have been made to increase the firm's trucking fleet to insure on-schedule deliveries with two refrigerated trailers being specifically designed to transport neoprene compounds in hot weather.

Develops Neoprene Magnesia

► Michigan Chemical Corp., St. Louis, Mo., has announced the development of a new grade of neoprene compounding magnesia, called "Michigan 1782." According to to the company, the new product is the result of more than three years of laboratory and plant research. The company reports that extensive chemical and functional tests indicate that for its intended application, Michigan 1782 is equal to any neoprene magnesia now on the market. Incorporated in standard formulae, it gives outstanding scorch resistance, with desirable physical properties at the most practical cure rate, the company states. This new magnesia has been designed specifically as a curing aid for neoprene, types W and WRT, particularly with "fast" accelerators. However, it has given equally good performance in batches of neoprene, type CN-A, the company reports.

U.S. Rubber to Close Plant

► U. S. Rubber Co., New York, N. Y., has announced it will close its latex plant in Manchester, N. H., to consolidate production in fewer plants nearer to customers and sources of raw material. According to the company, the step was being taken to reduce production costs to meet increasing competition. Approximately 190 employees will be affected by the closing, which will be accomplished over a period of five months. Some of the production machinery will be moved to other plants and some will be scrapped, the company states. The plant itself will be offered for sale or lease.

Glidden Names Six

► Chemicals-Pigments-Metals Division of The Glidden Co., Cleveland, Ohio, has named Ralph B. Quelos as general sales manager, and James C. Rankin as manager of national accounts. The company also announced that William P. Weber has become district sales manager for the division and will be responsible for sales in New England, eastern New York, New Jersey and eastern Pennsylvania. George H. McElroy, who has been a sales representative for the division for 22 years, was appointed district sales manager with the territory of Ohio, Indiana, Michigan and Kentucky, as well as the western portions of New York and Pennsylvania. C. Russel Hale, formerly sales representative in the New Jersey area, has been named district sales manager in the Chicago area. William J. Barnett will continue as southern sales manager and his territory has been expanded to include North Carolina, Virginia and the eastern portion of Maryland.

Offers Ultrabond 801

► Polytex Adhesives Corp., Wallington, N. J., has introduced "Ultrabond 801," a gray solvent based fluid rubber-resin cement, for difficult adhesion jobs. Said to adhere strongly on glass, wood, ceramics, leather, fabric, cork, steel, aluminum and composition materials, the product is also highly water resistant and serviceable to boiling water temperatures. It has already been used in many diverse fields. Ultrabond is applied by means of brush, spray or roller coater. In addition to its fast wet bonding properties, it may be coated and dried on continuous rolls or sheets of sponge rubber, metal, felt, paper or cloth, the company states. The dried film has no tack, but may be readily reactivated with simple solvents at the point of use.

Acquires Molded Rubber Firm

► A new group has taken over control of Molded Rubber & Plastic Corp., Milwaukee, Wisc. The group consists of Paul G. Boemer, *president;* Edward J. Boemer, *treasurer;* Alfred C. Mittag, *general manager;* and John S. Taylor, *vice-president.* Paul Boemer succeeds Harry Apple as president. The new management, according to Mr. Boemer, has developed new techniques and revamped the sales force.

Stuebing Named Representative

► Russell J. Stuebing has joined the sales staff of Whittaker, Clark & Daniels, Inc., New York, N. Y., as representative for Whittaker products distributed to the paint and rubber industries. Mr. Stuebing was previously associated with such organizations as C. K. Williams, Sherwin Williams Co., and Krumbhaar Chemicals, Inc.

Seiberling Shifts Personnel

► Seiberling Rubber Co., Akron, Ohio has announced its second series of personnel changes in its expanding research and development staff. Reed L. Schild, chief tire compounder, has been named chief chemist. Sam I. Roudebush, special production coordinator, has been named manager of tire research. Vernon E. Musser, formerly tire design engineer, becomes chief technical service engineer. A. B. Gill, who had been fabric technologist, has been appointed manager of fabric development. Glen R. Westenbarger, formerly development compounder, has been named chief service compounder.

Mr. Schild had been chief tire compounder since 1953. A graduate of Kent State University, he joined Seiberling as a chemist in 1939. Mr. Roudebush joined the company in 1953 as assistant manager of tire design. He was plant manager of the Seiberling affiliated tire firm in Bogota, Colombia, from 1954 to 1958. Mr. Musser started with the company in 1946 as a tire design draftsman. He also served in tire testing. Mr. Gill has been in fabric development since 1950. He was a supervisor in the physical testing laboratory in 1949, the year he joined the company as a chemist. Mr. Westenbarger joined Seiberling in 1951 as a laboratory supervisor. He has been in development compounding since 1954.

Firestone Promotions Announced

► Firestone Tire and Rubber Co., Akron, Ohio, has announced the promotion of J. Robert Swenson to plant engineer and B. C. McConnell to chief chemist at the company's synthetic rubber plant in Akron. Mr. Swenson was graduated from Kansas State College with a degree in chemical engineering. He joined Firestone in 1943 and has served the company as a junior chemical engineer, a chemical engineer and a staff chemical engineer. He is a member of the American Institute of Chemical Engineers.

Mr. McConnell is a graduate of the University of Akron with a degree in chemistry. He started with Firestone in the company's Gunmount Division in 1942 and in 1950, he was transferred to the quality control laboratory of the Akron synthetic rubber plant where he served as a chemist. He belongs to the Chemistry Club at Akron University and to the American Chemical Society.

Completes Ohio Facilities

► Plastics and Coal Chemicals Division of Allied Chemical Corp., has announced the completion of new phthalate ester plasticizer facilities at its Toledo, Ohio, plant. According to the company, the new facilities will serve the midwest by direct bulk and drum shipments as well as through six bulk stations located in major cities.

New RMA Council Formed

► The Rubber and Vinyl Flooring Council has been formed as a subsidiary of the Rubber Manufacturers Association, C. P. McFadden, chairman of the Flooring Division of R. M. A., announced recently. Headquarters will be located at 444 Madison Ave., New York, N. Y. "The council will expand the rubber flooring promotional program carried on for many years by the Flooring Division of R. M. A. and will also sponsor joint promotion of solid vinyl flooring, with emphasis on the long wearing beauty of these two aristocrats of the flooring field," said Mr. McFadden, who will be chairman of the council.

Mr. McFadden stated that one objective of the program will be to clarify the meaning of solid vinyl as the highest quality vinyl flooring as differentiated from the various other types commonly called vinyl. Members of the council include American Biltrite Rubber Co.; Bonafide Mills, Inc.; Danbury Rubber Co.; General Tire and Rubber Co.; B. F. Goodrich Co.; Goodyear Tire and Rubber Co.; Kentile, Inc.; R. C. A. Rubber Co.; Robbins Floor Products, Inc.; and Vinyl Plastics, Inc.

Trans-Rib Truck Tire

► Seiberling Rubber Co., Akron, Ohio, has added a new lug-type tire to its product line in order to meet new tire demands created by the expanding trucking industry. Called the "Trans-Rib," the tire was designed for heavy duty highway service. Seiberling engineers developed the Trans-Rib to keep pace with current trends to heavier freight shipments over the road, and larger, more powerful trucks. The tire is said to have a combination of features which provide long wear despite today's more severe operating conditions. It is built with nylon cord for maximum protection against heat; has a wider tread for increased road contact and mileage performance; and extra rubber has been added to the shoulders, a sensitive wearing area in tandem axle operations.

Presents $50,000 to Universities

► B. F. Goodrich Co., Akron, Ohio, has announced that the company has presented gifts totaling $50,000 to five leading privately financed universities. Unrestricted gifts of $10,000 each have been made to Harvard, Yale, Princeton, Cornell and the University of Chicago, according to J. W. Keener, company president. This is a part of the company's program of Aid to Higher Education, which includes student scholarships; employee tuition sharing with matching gifts to institutions training employees; dollar for dollar matching of employee gifts to colleges and universities; and research grants. Mr. Keener said that colleges and universities throughout the nation received more than $120,000 in 1958 under this program.

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Financial News

Thiokol Chemical

► For 1958: Net income of $3,007,699, which is equal to $2.05 per share, compared to $1,816,416, or $1.41 per share, in the preceding year. Sales in 1958 totaled $88,993,121 compared with $55,349,962 in 1957. Per share earnings in 1957 were adjusted for 5 per cent stock dividend in 1958. Figures for both 1957 and 1958 include operations of Reaction Motors, Inc., which was merged into the company in 1958.

U. S. Rubber

► Quarter to March 31: Net income of approximately $10,200,000, which is equal to $1.55 a share of common stock, compared with $3,891,000, or 45c a share, in the same quarter of 1958. Sales in the first quarter of this year were approximately $249,000,000, compared with $196,000,000 in the first quarter of the preceding year.

Firestone

► Quarter ended January 31: Net income of $14,304,391, which is equal to $1.66 per common share, compared with $11,697,239, or $1.38 a share, in the first fiscal quarter of 1958. Sales in the 1959 first fiscal quarter totaled $272,471,860, compared with $250,274,188 in the same period of the preceding year.

Witco Chemical

► For 1958: Net income of $1,911,166, which is equal to $2.85 per share, compared with $1,453,180, or $2.39, in the preceding year. Net sales and other income last year totaled $39,942,719 compared with $40,424,958 in 1957. The net income figure for 1958 includes a special item of $272,888.

Eagle Picher

► Quarter to February 28: Net income of $1,051,239, which is equal to $1.05, compared with $504,834, or 50c, in the first fiscal quarter of the preceding year. Sales in the three months to February 28 totaled $28,886,125, compared with $24,201,133 in the 1957 first quarter period.

National Starch Products

► Quarter to March 31: Net income of $692,315, which is equal to 69c per share, compared with $583,048, or 59c a share, in the first quarter of the preceding year. Sales in the three months to March 31 totaled $12,374,035, compared with $10,632,243 in the equivalent period of 1958.

Allen Industries

► Quarter to March 31: Net income of $462,768, which is equal to 68c per common share, compared with $273,022, or 40c a share, in the first three months of 1958. Sales in the first quarter of 1959 totaled $11,321,000, compared with $9,378,500 in the equivalent period of the preceding year.

Mohawk Rubber

► Quarter to March 31: Net income of $230,000, which is equal to $1.02 per share, compared with $108,000, or 48c a share, in the first quarter of 1958. Sales in the first three months of this year totaled $5,900,000, compared with $4,600,000 in the same period last year.

Stauffer Chemical

► Quarter to March 31: Net income of $3,719,000, which is equal to $1.03 a share, compared with $2,746,000, or 76c a share, in the 1958 first quarter. Sales in the first quarter of this year totaled $38,117,000, compared with $37,569,000 during the same period last year.

General Cable

► Year ended December 31: Net income amounted to $6,465,719, equal to common share earnings of $2.17, compared to $11,099,167, equal to $3.80 per share for 1957. Net sales for 1958 were $130,864,761, compared to $172,757,543 for 1957.

National Rubber Machinery

► For 1958: Net loss of $146,523, compared with $208,098, or $1.01 per share, in 1957. Sales last year totaled $8,249,809, compared with $13,280,030 in the preceding year.

Union Carbide

► Quarter to March 31: Net income of $41,581,000 which is equal to $1.38 per common share, compared with $22,830,000, or 76c a share, in the same period of the preceding year.

United Shoe Machinery

► Year to February 28: Net income of $9,153,318, which is equal to $3.81 per common share, compared with $9,803,835, or $4.08 a share, in the preceding fiscal year.

Detroit Gasket

► For 1958: Net income of $119,745, which is equal to 15c per share, compared with $400,476, or 51c a share, in the preceding year.

Armstrong Rubber

► Six months ended March 31: Estimated consolidated net income of $1,500,000, which is equal to approximately 97c per share, compared with with $955,062, or 61c a share, in the same period of the preceding year. Sales in the fiscal six month period ended March 31, totaled an estimated $40,700,000, compared with $32,467,265 in the same period of the previous year.

Reeves Brothers

► Nine months to March 28: Net income of $432,523, which is equal to 38c per share, compared with $228,112, or 20c a share, in the equivalent nine month period of the preceding year. Sales in the fiscal nine months to March 28 totaled $42,418,569, compared with $39,527,480 in the same period last year. The net income figure for 1958 includes a net loss of $117,293, or 10c a share, on sale of property.

St. Joseph Lead

► For 1958: Net income of $3,986,880, which is equal to $1.47 a common share, compared with $8,026,273, or $2.95 a share, in 1957. Sales last year totaled $75,615,147, compared with $106,869,846 in the preceding year. Earnings for 1958 include $2,610,073 in dividends for foreign investments, compared with $1,782,169, the year before.

U.B.S. Chemical

► Year ended December 31: Net income for the year amounted to $176,722, equal to earnings of $1.08 per share of stock, compared with $303,042, equal to $1.92 per share, for 1957. Net sales in 1958 totaled $4,742,108, compared with $5,148,044 for 1957.

Seiberling Rubber

► For 1958: Net income of $1,070,089, which is equal to $2.06 per share of common stock, compared with $943,011, or $1.75 a share, in 1957. Sales last year totaled $48,134,084, compared with $46,934,437 in the preceding year.

Hewitt-Robins

► For 1958: Net income of $898,281, which is equal to $2.15 per share of common stock, compared with $1,397,542, or $3.43 a share, in the preceding year. Sales last year totaled $49,031,220, compared with $57,327,072 in 1957.

H. K. Porter

► For 1958: Net income of $3,481,475, which is equal to $3.02 per common share, compared with $6,351,283, or $5.77 per share, in 1957. Sales during 1958 totaled $136,622,363, compared with $153,503,048 the year before.

Seiberling Names Three

► Seiberling Rubber Co., Akron, Ohio, has announced that E. H. Gibbs, formerly manager of the Development Department, has been named manager of tire development and research. The company also named Ralph T. LaPorte, formerly chief chemist, manager of tire research and compounding, and Orris H. Johnson, formerly manager of tire design, manager of tire engineering. According to the company, the appointments are a step in its program of expanding tire research and development to bring out entirely new types of tires and related products.

Mr. Gibbs attended Clark University and then worked for Fisk Rubber until 1928. He then joined Seiberling as a chemist and later became chief chemist for the firm's Toronto plant. He also was manager of tire design and of foreign plant service. He is a member of the American Chemical Society and the Society of Automotive Engineers. Mr. LaPorte was graduated from Ohio State University in 1924 and then joined Seiberling. He became chief chemist in 1936. He is a member of the technical advisory committee of Copolymer Rubber & Chemical Corp., and past-chairman of the Akron Rubber Group. Mr. Johnson was graduated from Purdue University in 1949 with a B.S. degree in mechanical engineering. He was employed by General Tire & Rubber Co., prior to joining Seiberling in 1954 as assistant manager of tire design. He is a member of the Akron Rubber Group and the Society of Automotive Engineers.

Endura Appoints Richardson

► Endura Corp., Quakertown, Penna., has announced the appointment of Spencer M. Richardson as research chemist. Mr. Richardson was formerly associated with the Firestone Tire & Rubber Co., where he had 16 years of intensive research and development experience on rubber, latex and foam rubber. According to Endura, Mr. Richardson will work on new product and new process development, and will create new latex impregnated and coated specialty papers. Special facilities for this work are provided in Endura's newly-expanded laboratories, which were recently enlarged.

Goodyear Changes Tire Names

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced that it has changed the names of two of its most popular passenger tire lines. The DeLuxe Super-Cushion tire has been renamed the "Safety All-Weather", and the Super-Cushion tire is now called "All-Weather". According to Goodyear, tire appearances, construction features, sizes and prices are not affected. In making the name changes, Goodyear is re-using a trade mark that first appeared in 1908 when the company's "All-Weather Diamond" tread was adopted.

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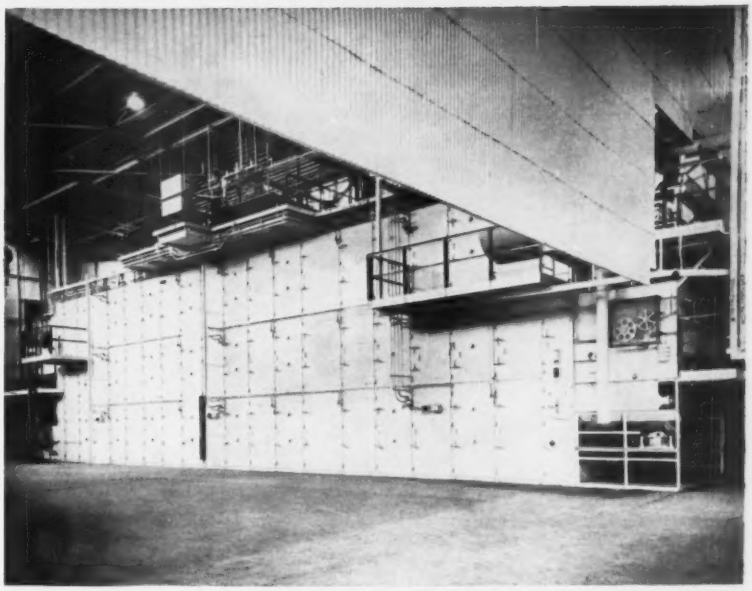

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Features developed by Sargent over many years of designing and building rubber dryers include: Silicone spraying at the feed end, to help prevent caking or rolling up of the crumb; Dryer sections zoned in groups with separate temperature and humidity controls; Highly efficient airlocks between dryer and cooler compartments; Breakers and brushes to assure a clean conveyor, and to reduce maintenance time and cost; Design that solved the dust problem — collectors are not needed at exhausts; A single housing for dryer and cooler — increases efficiency, speeds the process cycle, lessens possibility of contamination of stock; Housing is covered with full height hinged doors and easily-removed panels for easiest possible cleanout, in least time; Every known safety device for protection of personnel, machine and stock; An exclusive, precision pre-assembly method that makes Sargent equipment the easiest and the quickest — and at lowest cost — of any dryer on the market to install in customer's plant.

Gas burners, safety certified of course, may be mounted on top of the dryer section for more efficient operation, easier servicing. Heat source for Sargent Dryers may also be oil, steam or electricity.

Shown above is a recently installed gas-fired, 3-pass synthetic rubber dryer with cooler. Only 2 gas burners are needed to bring this dryer up to working temperature in less than ten minutes.

Sargent experience and engineering can help you save time, money, man-hours in your drying process, producing a top quality, uniform quality product. Let us give you details.

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Names in the News

Robert M. Henderson, formerly with the Market Research Department of American Cyanamid Co., has been named director of Market Research Division of Petroleum Chemicals, Inc.

J. W. Keener, president of B. F. Goodrich Co., has been re-elected a board member of the National Industrial Conference Board.

DeWitt A. Forward, vice-president and director of the First National City Bank of New York, has been elected to the board of directors of Phillips Petroleum Co.

Thomas H. Smith, manager of the Chemicals and Pigments Purchasing Department of B. F. Goodrich Co., has been selected "honor buyer of the year" by the Chemical Salesmen's Club of Cleveland, Inc.

W. D. LaDue, plant engineer at Goodyear Tire & Rubber Co., has retired after 42 years of continuous service.

Francis H. Atkins, formerly general credit manager for B. F. Goodrich Industrial Products Co., has been named assistant treasurer of B. F. Goodrich Co.

Reginald P. Perry has been appointed vice-president of both Lukens Laboratories and its associate corporation, Skinner and Sherman Co., Inc.

G. P. Oldham, previously vice-president and general sales manager of Gustin-Bacon Co., has been named vice-president in charge of marketing for the Barrett Division of Allied Chemical Corp.

Frank A. Magno has been appointed assistant manager of the New York sales office for Godfrey L. Cabot, Inc.

Homer A. Smith has been appointed assistant manager of chemical distributor operation for Minerals & Chemicals Corp. of America.

Howard D. Shorts has been named manager of the Urethane Foam Laboratory of the Witco Chemical Co., with headquarters at Chicago, Ill. He formerly was a urethane foam chemist with Hewitt-Robins.

Marshall D. Payn has been appointed Rocky Mountain district manager for OPW-Jordan.

David H. Allen, general contracting manager, U. S. Rubber International Division, and **John N. Hart,** controller, B. F. Goodrich Co., have been elected to membership in the Controllers Institute of America.

Joseph W. Gardiner, Jr., manager of the Pigment Division of the Philadelphia branch of the National Lead Co., has retired from his post after 38 years of service.

Harvey S. Firestone, Jr., board chairman of the Firestone Tire and Rubber Co., has been elected national chairman of the United Service Organizations, Inc., for the ninth consecutive year.

Robert L. Marlowe has been appointed a technical man in the Physical Research Department of the B. F. Goodrich Co. Research Center.

Theodore I. Veiock, who was formerly a tire production specialist for the Firestone Tire and Rubber Co., has been appointed assistant to the president for the Lee Rubber and Tire Corp.

Theodore D. Trowbridge, who recently received his S.M. in engineering practice from the Massachusetts Institute of Technology, has joined the applied research section of the New Products Research Department of Godfrey L. Cabot, Inc.

Dr. E. A. Youngman, who has been with the company since 1952, has been appointed a research supervisor in the Synthetic Rubber Department of the Shell Development Co. Emeryville laboratories.

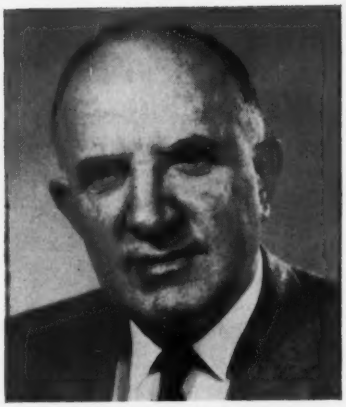
Dr. G. T. E. Graham has been appointed inventors' representative for the U. S. Rubber Co. succeeding **R. K. Kuhns,** who is joining the law firm of Arthur, Dry and Dole.

Grover C. Clark, previously manager of merchandising and oil company sales for the Tire Accessories Division of the B. F. Goodrich Co., has joined Chemstrand Corp. as supervisor of tire merchandising.

William A. Barnwell, Jr., formerly a chemical engineer for the Dow Chemical Co., has been named a chemical sales representative for the Chemical Machinery Division of Baker Perkins, Inc.

Richard Meehan, executive vice-president for H. Muehlstein and Co., Inc., has been re-appointed chairman of the Crude Rubber and Importers Division of the New York Red Cross Chapter's 1959 Fund Campaign.

Souren Mouradjian, who was formerly with the Royal Electric Corp., has been named chief chemist at the Ansonia Wire and Cable Co.



A. G. Treadgold

Elected to New Post

► United Carbon Co., Charleston, West Va., has elected A. G. Treadgold, who has been with the firm since its formation, as vice-president of manufacturing. H. B. Lawson, the company's controller, has been named vice-president of finance. John H. McKenzie, head of research and development, has been elected vice-president of research and development, and Frank Lindeman, Jr., general manager of the company's gas and oil operations, has been named vice-president of gas and oil. The vice-presidents, who will have their headquarters in Charleston, are also officers and directors of United Carbon subsidiary companies.

Mr. Treadgold has been assistant treasurer for the company and president of its synthetic rubber manufacturing subsidiary, United Rubber and Chemical Co. Mr. Lawson joined the firm in 1958 as controller and subsequently was elected assistant secretary and assistant treasurer. He was formerly associated with the Dobeckmun Co. and earlier, with the Firestone Industrial Products Division. Mr. McKenzie was associated with American Can Co. as assistant to the general manager of research and development before joining United Carbon last year. Mr. Lindeman, formerly with Pan American Petroleum Corp., has headed the firm's gas and oil operations since last August.

George Harkins has been named manager of industrial relations at Seiberling Rubber Co. succeeding **James K. MacDougall,** who has left the company. **Russell E. Hanna** has been appointed personnel manager.

R. A. Jones, formerly manager of market development, has been named sales manager of molecular seives at Linde Co., Division of Union Carbide Corp.

John J. Paredes has joined the sales force organization of Geigy Industrial Chemicals.

AviSun Corporation Formed

► American Viscose Corp. and the Sun Oil Co. have established an equally owned affiliate, AviSun Corp., located in Philadelphia, Penna. According to the parent companies, AviSun will be an integrated company for the manufacture, processing and sale of polypropylene resins, film, fibers, elastomers, surface coatings and adhesives using olefin polymers or copolymers with other substances. Commercial quantities of polypropylene resin are expected to be available by midsummer from leased facilities of the Port Reading, N. J., linear polyethylene plant of Koppers Co., Inc. The capacity of the converted plant is estimated to be 20 million pounds per year.

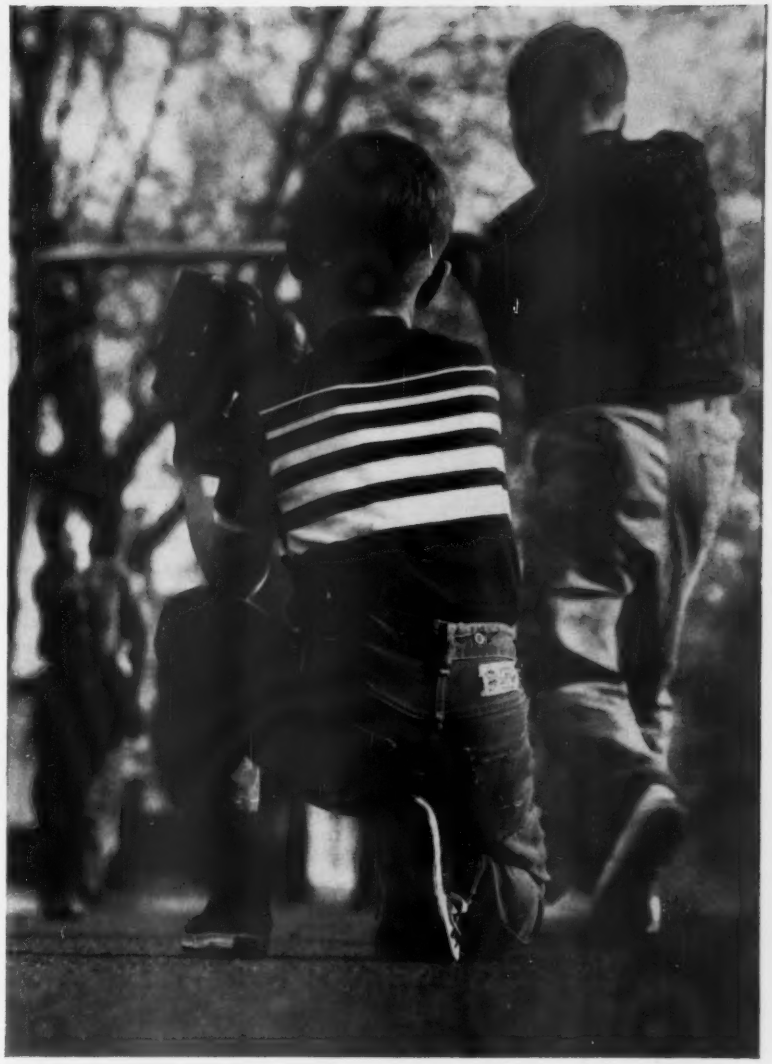
Chalmer G. Kirkbride, executive director of research and engineering for Sun Oil, has been elected president of AviSun; William H. Brown, vice-president and treasurer of Viscose, has been elected treasurer and assistant secretary; and Joseph T. Wilson Jr., assistant secretary and assistant treasurer for Sun Oil, has been elected secretary and assistant treasurer of the new affiliate.

United Carbon Builds Laboratory

► United Carbon Co., Charleston, West Va., will erect a technical service laboratory in Akron, Ohio, in order to assist the rubber industry and allied manufacturers in making the most effective use of the firm's products. Clearing of the site for the new structure is now underway at 1034 S. High St., and completion of the 11,000 square foot building is scheduled to take place late this summer. The laboratory, to be of masonry and steel construction, will have complete facilities for an initial staff of about 20 scientists, engineers and technicians. Included on the main floor will be five offices, six laboratories and a library. The basement will have space for additional offices and laboratories, a conference and lunch room and test rooms. Frank O. Holmes, Jr., United Carbon's manager of sales development, will direct laboratory activities.

Titanium Names Representatives

► Titanium Pigment Corp., a subsidiary of the National Lead Co., New York, N. Y., has announced that William H. Abels, formerly a sales representative in the New England sales district, has been transferred to the North Central sales district, with headquarters at Pittsburgh, Penna. John P. Burke has been named a sales representative for the New England sales district with headquarters at Boston, Mass. Mr. Abels, a graduate of Lafayette College, was first employed by Titanium in 1950 as a sales trainee, moving to Boston as a sales representative in June, 1950. Mr. Burke joined the company as a sales trainee in September, 1958. He was graduated from Brown University.



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Want to make *better* rubber soles, floor tiles, other rubber products? Then it's time to investigate versatile, economical SOLKA-FLOC.

This finely divided wood cellulose reduces blistering and nerve, controls shrinkage, improves dimensional stability. It permits sharper designs and harder, smoother surfaces. It solves your dispersion problems.

Let us show you how SOLKA-FLOC* adds sales appeal to your products, scores with the customer, increases your profits. Write to us outlining your specific process problems. Address Dept. FG-5, our Boston office.

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Firestone Premium Quality Tire

► Firestone Tire and Rubber Co., Akron, Ohio, has introduced a new safety tire for passenger cars called the Firestone "Premium Quality Tire." According to current reports, the tire is priced 15 to 20 per cent below the Firestone "Supreme," the company's previous premium line, which has been dropped. Two basic innovations have been incorporated in the new tire including an elastic Silver Safety Seal built into the inner part across the tread area and the use of nylon cord in its body which has been subjected to a three-stage stabilizing treatment.

According to Firestone, the Silver Safety Seal is made of the highest quality compounds including Diene rubber, and replaces the former gummy sealant which has been used for some time as a seal against puncturing objects. The three-stage process utilized in the treatment of the nylon cord removes nylon's tendency to stretch during the tire manufacuring process and its life on a car, Firestone states. A patented diaphragm is said to provide blowout protection. Construction of the diaphragm is similar to that of a regular tire and it is mounted inside the casing of the Premium Quality tire on its own bead ledge. Another advantage of the new tire is that it will give more mileage because of its cooler running characteristics, according to the company.

Armour Plans New Plant

► The Adhesive Division of Armour and Co., Chicago, Ill., has announced its plans for the construction of a new soluble dried blood plant at St. Paul, Minn., which is expected to have a capacity of 5 to 7 million pounds of soluble blood a year. According to Armour, the plant is designed to be the most modern high temperature, spray dried blood operation in the world, and is scheduled to be in operation by May, 1959. Animal blood collected at Armour meat packing plants will be used to produce an adhesive with a special, water resistant property, and the product is for use in the paper, cork, rubber, plywood and mineral flotation fields, the company stated.

Texas-U. S. Moves Headquarters

► Texas-U. S. Chemical Co. will move its headquarters from New York City to Port Neches, Texas. Although details have not been completed, the move is tentatively scheduled for early June. Employees involved will be permanently located in the existing offices at the company's Port Neches plant. The sales staff will continue to make its headquarters in New York City from which it directs domestic and foreign sales of the company's line of Synpol synthetic rubbers. Research and technical service laboratories will be maintained at Parsippany, N. J.

James B. Braden

Appointed Assistant Manager

► United Carbon Co., Inc., Charleston, West Va., has announced the appointment of James B. Braden as assistant manager for sales development. He will have his headquarters in Akron, Ohio, and will serve as sales technical service representative from United's new laboratory in Akron. Mr Braden is a chemical engineering graduate of Ohio State University, and has taken advance study in chemistry at the University of Akron, Indiana University and Indiana Technical College. He has been associated with the rubber industry since 1937, starting as a research chemist with Goodyear Tire & Rubber Co. Mr. Braden formerly was chief chemist for the Industrial Rubber Goods Co., and since 1954, he served as factory manager for Dryden Rubber Division of Sheller Mfg. Corp. He is a member of the American Chemical Society, American Society for Testing Materials, American Society of Plastic Engineers and the Chicago, Fort Wayne and Akron Rubber Groups.

Georgia Kaolin Calcined Clays

► Georgia Kaolin Co., Elizabeth, N. J., has announced the availability of its "Glomax Series" of calcined clays, which find particular application in the paint industry. The company has completed a three year study of these calcined clays and their effects in emulsion paint systems. Included in the study are the effects of calcined clays on the properties of acrylic, butadiene-styrene, polyvinyl acetates, homopolymer and copolymer paint systems and data on reflectance gloss, contrast ratio, stain removal, enamel holdout, and color uniformity. The effect of different pigment volume concentrations and loading levels have also been investigated. The results of the study, which required the making and testing of some 290 paints are summarized in a new brochure "TSBG-6", which has been issued by the company.

Jefferson Chemical Appointments

► Jefferson Chemical Co., Inc., Houston, Texas, has announced the appointment of R. E. Werley, Jr., previously midwestern regional manager, as sales manager with headquarters in the company's offices at Houston, Texas. The company has also appointed David B. Percy as a sales representative for the eastern region and Allen M. Brandt as a technical service man in Houston. Mr. Werley, a graduate of Lehigh University, joined the company in 1952 as a sales representative for the New England territory and was later made district sales manager of the Chicago territory. He previously served with the Cities Service Oil Co., and a subsidiary of that firm, Petroleum Advisers, Inc.

Mr. Percy obtained his B.A. degree in chemistry from Gettysburg College and an M. B. A. degree in marketing from the University of Kansas. Before joining Jefferson, he was in technical service and development for the Dow Chemical Co. He will be located in New York City and will report to R. M. Roach, district manager. Mr. Brandt was graduated from Texas A & M College with a B.S. degree in chemical engineering, and was previously associated with the Marketing Department of the Shell Chemical Co. He will be located in Houston and will report to H. A. Tenney, manager for antifreeze sales.

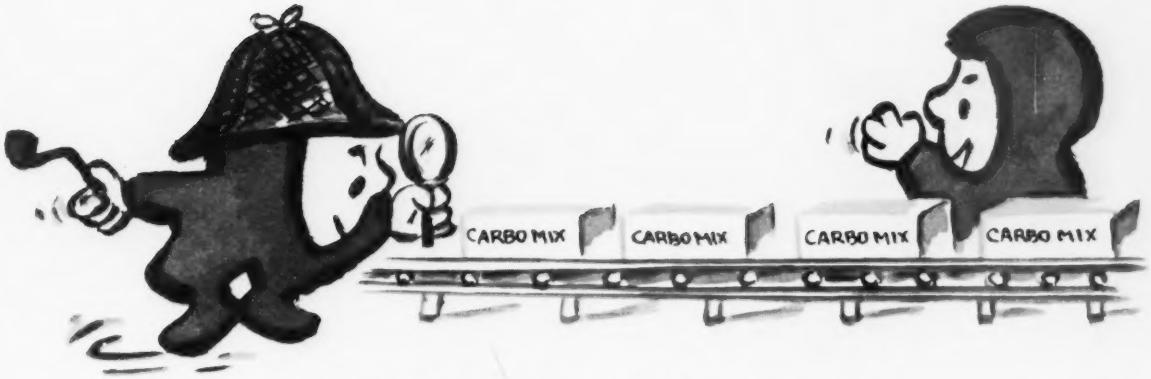
Ohrstrom Acquires H. B. Egan

► G. L. Ohrstrom & Co., New York, N. Y., has acquired the H. B. Egan Manufacturing Co., Muskogee, Okla., and its subsidiaries, Ace Rubber Co., Lucky Strike Patch Co., Arrow Printing Co., Oklahoma Cushion Co., and H. B. Egan Co. of Canada, Ltd. H. B. Egan, said to be the largest manufacturer of motor car tire and tube repair materials in the United States, started in 1923 with an initial capital of less than $25,000 and has grown to an annual sales volume of approximately $3 million. Its products are distributed throughout this country and in most foreign countries. Jim A. Egan will continue as president of the company.

Goodrich to Close Plant

► B. F. Goodrich Products Co., a division of B. F. Goodrich Co., Akron, Ohio, will terminate operations at its Cadillac, Mich., plant on May 1. The company reports that the plant, which produces molded and extruded rubber parts for the automotive industry and employs about 200 persons, cannot continue to operate due to increased employment costs without an attendant productivity increase. According to Goodrich, competitors paying lower wage rates and benefits, have been able to make bids on prospective business that, while providing a reasonable profit for them, have been below Goodrich's factory costs.

It's elementary, my dear Watson!



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A major problem in the production of Black Masterbatches historically has been the elimination of excessive moisture content in the finished product. Copolymer has developed unique equipment to analyze automatically each bale of **CARBOMIX** and to reject any bales which contain moisture in excess of specification limits. This equipment is the first of its kind to be used in the synthetic rubber industry and assures the rubber compounder of uniformly dry **CARBOMIX SUPER-DISPERSED BLACK MASTERBATCH.**

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Polymel's new Plasticil does the job better . . . faster . . . and more economically! This material has splendid softening action in natural rubber and GRS polymers and is highly compatible. Plasticil will not only act to give good flexibility, good abrasive resistance, excellent mold-ability, but it can be used from 5 to 35 parts on the rubber to obtain excellent processing without any deleterious effect on the physical properties of the finished product. Plasticil can be used to great advantage in Footwear Stocks, Sponge Compounds, Wire Insulation Compounds, Rubber Mats, Tires, Tire Tread Stocks, Footwear Materials and all types of mechanicals. It is practically free of any discoloring effects.

PRICES: Truckloads . . 11¼ cents • 5000 lb. Truckloads . . 11½ cents.
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IT'S POLYMEL FOR compounding ingredients for Reinforcing, Plasticizing, Extending and Processing Natural and Synthetic Elastomers AND RELATED PRODUCTS.

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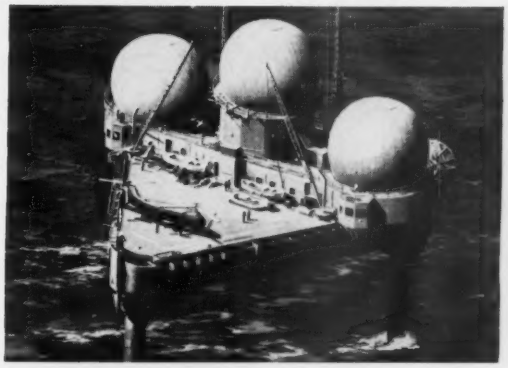
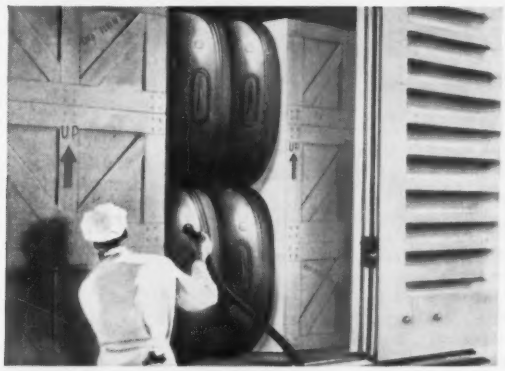


"Texas Tower" radomes of rubberized nylon are supported by interior air pressure. Nylon base fabric by Wellington Sears.

INFLATABLES



Inflatable dunnage bags are made of neoprene-coated nylon enclosing rubber air chamber. Wellington Sears base fabric.

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Collapsible fuel tank, made of rubberized nylon fabric, is a filling station dropped from the air. Base fabric by Wellington Sears.

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Alco Oil Staff Changes

► Alco Oil & Chemical Corp., Philadelphia, Penna., has announced several personnel changes including the promotion of John P. Seguin, formerly New England sales representative, to vice-president. Mr. Seguin has maintained a regional sales office in Providence, R. I., since he joined the company in 1953, to service the sales of latex compounds and rubber chemicals in the New England area. Roger B. Gookin has been appointed to succeed Mr. Seguin as a sales representative at the Providence, R. I., office, and he will service sales of latex compounds and rubber chemicals. Mr. Gookin was formerly associated with General Latex and Chemical Corp., Cambridge, Mass.

Alco has also appointed Daniel L. Worth to represent the company in the South from a new Regional Office to be located in or near Greenville, S. C. Mr. Worth was transferred from his former position as a development chemist which started in 1956 in the Research Laboratory and later in the Sales Laboratory, where he specialized in the evaluation and applications of warp sizing chemicals and acrylic latices for textile coatings. Thomas C. Holst has been appointed a technical sales representative for the sales and application of latex compounds and chemicals for the textile, paper, and adhesives trades. Mr. Holst was formerly associated with General Latex and Chemical Corp. as a Middle Atlantic representative. Richard J. Mahoney, who recently returned from active duty with the U. S. Army in Alaska, has joined Alco as a member of the Sales Service Laboratory. Mr. Mahoney was formerly a development chemist for the Naugatuck Chemicals Division of the U. S. Rubber Co.

U.S. Rubber Names Norris

► Howard K. Norris has been named production manager of the Mechanical Goods Division of U. S. Rubber Co., New York, N. Y., succeeding W. A. Armstrong, production manager since 1949, who has retired. Mr. Norris graduated from the University of Illinois in 1939 and joined the U. S. Rubber Tire Sales Department in New York City the following year. In 1942 he became part of the company team that operated government-owned munitions facilities under contract, moving into the purchasing area. After a brief time in the Purchasing Department at the company's wire and cable plant in Lowell, Mass., he joined the Mechanical Goods Division at its Gilmer plant near Philadelphia in 1945. In 1952 he transferred to the Passaic, N. J. plant as administrative assistant to the factory manager. Mr. Norris returned to Gilmer in 1953 as assistant factory manager, and became factory manager in 1957.

Willard E. Fabing

Joins Burton Rubber

► Willard E. Fabing has been named vice-president of the Engineering and Technical Division for the Burton Rubber Processing Co., Burton, Ohio. Mr. Fabing, a graduate of Purdue University, will supervise the Burton Custom Compounding Laboratory, which is available to clients for consultation assistance. Previous to joining Burton Rubber, Mr. Fabing was chief chemist and technical superintendent at Clevite Harris Products, Inc., and before that he was a senior product engineer for the B. F. Goodrich Co.

Named Director of Research

► Rhodia, Inc., New York, N. Y., has announced the appointment of Dr. Walter C. Meuly as director of research. Dr. Meuly was formerly associated with E. I. du Pont de Nemours & Co., Inc., in New Brunswick, N. J., where he served for 35 years in various capacities which included those of production manager of the Fine Chemicals Division's New Brunswick plant, and more recently, research associate specializing in organic (synthetic) chemistry at DuPont's Jackson Laboratory. Dr. Meuly is a graduate of the Polytechnic Institute of Zurich, Switzerland, and is considered an authority in aromatic chemical research.

Anaconda Acquires Subsidiary

► Anaconda Wire and Cable Co., New York, N. Y., has entered into an agreement to purchase 100 per cent of the stock of Sequoia Wire and Cable Co., Redwood City, Calif., from Mandrel Industries, Inc. According to Anaconda, it will operate Sequoia as a wholly-owned subsidiary for the manufacture of small wires for use in aircraft, missile and electronic controls.

RMA Subdivision to Meet

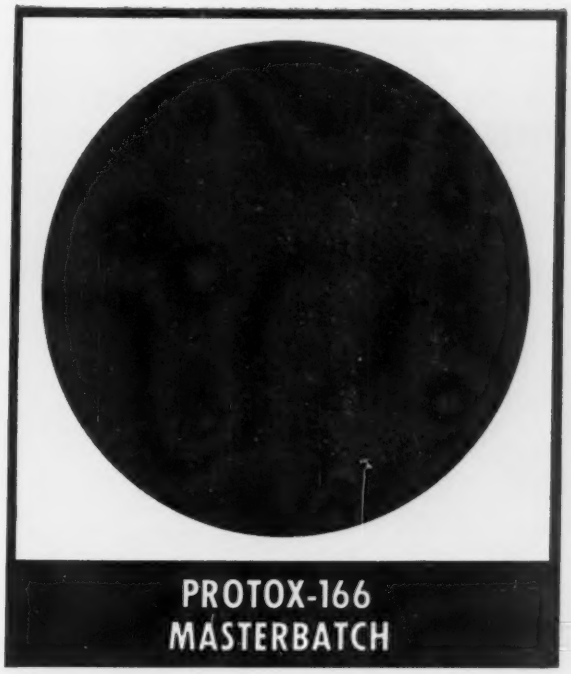
► The Annual Meeting of the Molded, Extruded, Lathe-Cut and Chemically Blown Sponge Rubber Manufacturers Subdivision of the Rubber Manufacturers Association will be held on June 25-27, at The Homestead, Hot Springs, Va. Built around the theme of "Blueprints for Better Sales Management," the convention will feature speakers who are experts in the field of sales management and guided missiles. Principal speaker at the opening session will be Dr. Kenneth B. Haas, chairman of the Department of Marketing at Loyola University, one of the country's foremost sales authorities. The speaker on guided missiles and the industry's role as a supplier in the missile and space programs will be Comdr. Robert J. Gutheim, staff director of plans and coordination for the director of guided missiles, Office of the Secretary of Defense. Two other speakers on the program will be J. A. Livingstone, financial editor of the *Philadelphia Bulletin*, who will discuss the business outlook for the nation and the industry in 1959-1960; and W. J. Sears, vice-president of RMA and chairman of its Public Affairs Committee, who will talk on the "Political Responsibilities of Management."

Dayton President Gives Talk

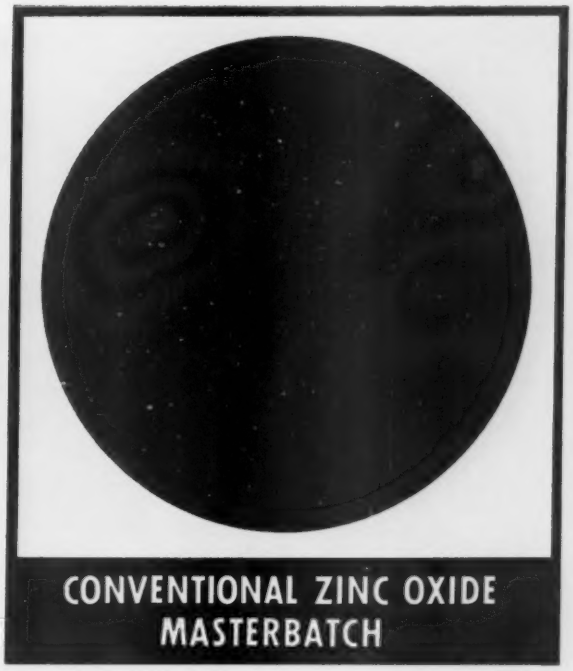
► Clowes N. Christie, president of Dayton Rubber Co., Akron, Ohio, predicted, in a talk before the Springfield, Missouri, Chamber of Commerce on April 13, that the future will see automobile tires molded from synthetic materials without cords, plies or expensive fabrication. Molded from solid urethane, tires of the future will give greatly increased mileage at considerably less cost, Mr. Christie said. He explained that tires made from solid urethane will hold normal air pressure indefinitely because of the non-porous nature of the materials, and they will give at least twice the mileage of any conventional tire and will cost far less. "There will come a time," he stated, "when tire prices will no longer be a factor in the motorist's budget."

Marbon Appoints Scott

► Marbon Chemical Division of the Borg-Warner Corp., Washington, West Va., has announced the appointment of Earl W. Scott as coordinator for latex and coatings development. Mr. Scott has been in the polymer and coatings field for over 15 years. He was formerly manager of new product development for the Coating Department of the Chemical Division of the Goodyear Tire and Rubber Co. He is a graduate of the University of Wisconsin and is a member of TAPPI, The American Chemical Society, AATCC and the Akron Rubber Group.



PROTOX-166
MASTERBATCH



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WHY PROTOX-166 ZINC OXIDE DISPERSES FAST IN *ANY* RUBBER

Customers tell us that Protox-166, unlike conventional zinc oxides, disperses well in *any* type of rubber batch (natural or synthetic) over a wide range of Mooney viscosity.

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1. **Protox-166 mixes into rubber without forming hard-to-disperse aggregates.**
2. **Protox-166 particles are electrically attracted by rubber.**
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Wright Elected President

► Schenectady Varnish Co., Inc., Schenectady, N. Y., has announced the election of Henry D. Wright as president, succeeding his father, the late W. Howard Wright, founder of the firm and its president since 1906. The company also announced that Clinton A. Braidwood was appointed vice-president, and George B. Tod has been elected treasurer and director. Mr. Wright, formerly executive vice-president and treasurer, has been with the company for over 25 years. He joined the firm after his graduation from the Wharton School of Finance and Commerce at the University of Pennsylvania. During his career, he has held a number of manufacturing, sales and administrative posts with the company. He is also president of Schenectady Varnish Canada, Ltd., Schenectady Varnish de Mexico and several other foreign affiliates.

Mr. Braidwood is a graduate of Michigan State College with a degree in organic chemistry. Formerly with Reichhold Chemicals and U. S. Rubber, he joined Schenectady Varnish as a member of its research staff in 1948. He has a number of patents in his name on resin polymerization and alkylation of phenol. He is a member of the American Chemical Society, Rubber Division, and the National Paint, Varnish and Lacquer Association.

Mr. Tod joined the company in 1936. He formerly was an officer of the Delaware County National Bank of Delaware, Ohio. He will continue to serve as purchasing agent and secretary of the company. He is a member of the Purchasing Agents Association of Eastern New York.

U. S. Industrial Names Three

► U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., New York, N. Y., has named Eugene C. Carlson as technical superintendent of its new petrothene polyethylene plant in Houston, Texas; E. P. Richards as chief engineer for the plant; and T. Howard Dantzler as the plant's superintendent of operations. Mr. Carlson received a B.S. degree in chemical engineering at the University of Arkansas in 1941. From 1942 until 1946 he served with the U. S. Army Chemical Corps. In 1946, Mr. Carlson joined Stanolind Oil and Gas and was senior process engineer before joining National Distillers in 1952.

Mr. Richards was graduated in 1947 from Texas A&M with a B.S. degree in mechanical engineering. He was with Ethyl Corp. from 1947 to 1948 and Copolymer Corp. from 1948 to 1953. Mr. Dantzler received his B.S. degree in chemical engineering in 1950 from Mississippi State College. Prior to joining National Distillers in 1954, he was employed by Pine Bluff Chemical Co. of Arkansas.

Jack S. Scheuer

Named Plant Manager

► Unilectric, Inc., Milwaukee, Wisc., has announced the appointment of Jack S. Scheuer as its general plant manager. Prior to joining Unilectric, Mr. Scheuer gained extensive experience as an engineer in management positions with Cords Ltd., Division of Essex Wire Corp.; Hatfield Wire & Cable, Division of Continental Copper and Steel Corp.; and Pirelli Ltd., Brussels, Belgium.

Expands Product Lines

► Molders Co., Newark, N. J., an agency which represents manufacturers of molded and stamped products, is expanding its product lines in order to effectively handle the addition of a nonconflicting but related line of rubber moldings. The firm, which operates in the New Jersey, Philadelphia and metropolitan areas, is now seeking contact with manufacturers who desire representation in those areas. Sales engineer for the firm, J. Sycle is a graduate of Virginia Polytechnic Institute with a degree in mechanical engineering and has eight years of individual sales and plant engineering experience in the rubber, plastics and metal industries.

Vansul Develops Rubber Paint

► Vansul Colors, Englewood, N. J., has announced the development of "Vanflex Colored Finishes" which uses a special synthetic rubber, Hypalon, and is designed for application to all rubber surfaces. According to the company, this new rubber base, extremely resistant to ozone, heat and light, is dispersed with approved colors and opaque white pigments in suitable petroleum solvents. The company states that when Vanflex is applied on rubber it will produce elastic or flexible glossy films with an adhesion far superior to conventional lacquers and enamels.

Copolymer Appoints Schultz

► Raymond F. Schultz, who was formerly associated with the Hercules Powder Co. as special assistant to the research director, has joined the Copolymer Rubber and Chemical Corp., Baton Rouge, La., as director of research and development. Dr. Schultz attended the University of Wisconsin and received a B.S. degree in chemistry in 1930. He is also a graduate of Harvard where he received an M.A. in 1933 and a Ph.D. in 1934. From 1934 to 1937, he served with E. I. du Pont de Nemours and Co., Inc., as a member of the Ammonia Department, where his research concerned high-pressure synthetic methods.

Dr. Schultz taught organic chemistry at Lehigh University from 1937 to 1941. While at Lehigh, he carried out research on chemical equilibria, reactions of aromatic compounds, and applications of resins. Associated with Hercules since 1941, he served as director of the Research Center near Wilmington, Del., and as a member of the staff of the Administrative Research Department. Dr. Schultz has been a member of the American Chemical Society since 1937 and has served the Delaware Section as chairman and as councilor. He is a charter member of the Gordon Research Conference. Honors which he has received include Alpha Chi Sigma and Phi Lambda Upsilon.

Opper Named Commodity Manager

► Richard K. Opper has been named reclaimed rubber commodity manager for the Naugatuck Chemical Division of U. S. Rubber Co. Mr. Opper, with the company since 1929, was formerly sales manager of Synpol synthetic rubber. He is a graduate of Massachusetts Institute of Technology and started with the company's central research laboratories. In 1933, he was assigned to the Mechanical Goods Division, and in 1945 he transferred to the Chemical Division. He became assistant manager of rubber chemical sales in 1950 and three years later, was named manager of rubber chemical and synthetic rubber sales. In 1957, he was appointed Synpol synthetic rubber sales manager.

Dayton to Double Tire Capacity

► Dayton Rubber Co., Dayton, Ohio, has announced plans to double its tire manufacturing capacity during 1959. According to the company, re-equipment at the main plant in Dayton is underway with the first of several mechanized conveyor lines already installed, and new presses and tire-building machines being delivered at regular intervals. When the process is completed some time this fall, Dayton will have a completely in-line tire production, with no lost motion, and with a high degree of automation.

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(Based on an actual conversation between a Du Pont Representative and a customer.)

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Goodrich Installs Automated Unit

► B. F. Goodrich Chemical Co., Cleveland, Ohio, has announced that a fully automated vinyl chloride monomer production unit its being installed at its Calvert City, Ky., plant. Expected to be completed in June of this year, the installation will be the first in the chemical processing field to utilize a revolutionary digital system to operate a chemical process specifically designed for computer control, Goodrich states. The "RW-300" system, engineered by the Thompson-Ramo-Wooldridge Products Co., Los Angeles, Calif., will exercise "closed loop" control over the process and will log operating data and computed values. The computer accepts instrument signals, computes at great speed, makes logical decisions and transmits signals to adjust the set points of numerous controllers in the process.

Investment for the computer and its auxiliary equipment, including installation programming and training of personnel will be nearly $200,000, a company spokesman said. The RW-300 computer is no larger than an office desk and weighs approximately 600 pounds. It is said to be the first industrial computer that incorporates many features of the digital computers developed to control missiles and advance aircraft. These features include built-in analog-digital conversion equipment, reliable transistorized circuitry, printed wiring, modular construction, and a large magnetic drum memory. The computer can store 8000 numbers or computer words in its memory, can add 1100 numbers per second, and multiply 350 per second.

Rubber Literature Symposium

► Division of Rubber Chemistry of the American Chemical Society has announced the publication of "Symposium on the Literature of Rubber." This work consists of the papers presented at the Joint Symposium of the Division of Chemical Literature and the Division of Rubber Chemistry during a meeting of the American Chemical Society in Atlantic City, N. J., on September 18 and 19, 1956. The purpose of the symposium is to serve as a guide to the recorded information on rubber.

Papers in the first part, No. 2 to 8, deal with basic sources of information including books, periodicals, indexes, and abstract publications on natural, synthetic and reclaimed rubber. This section also demonstrates the way in which this information is made accessible in libraries to those working on research problems. The second part, Nos. 9 to 14, discusses special forms of publications and how rubber literature is created and disseminated. The publication is available at $2.50 per copy from the treasurer of the Division of Rubber Chemistry, G. E. Popp, Phillips Chemical Co., Akron, Ohio.

Talmadge W. Cobb

Named Harwick Representative

► Harwick Standard Chemical Co., Akron, Ohio, has announced the appointment of Talmadge W. Cobb as sales representative for its Greenville, S. C., territory. Mr. Cobb will be headquartered at Greenville and will contact accounts in North Carolina, South Carolina, Florida, eastern Tennessee and eastern Georgia. Harwick maintains an office and warehouse facilities in Greenville as a service to the rubber, plastics and paint industries.

Krivitsky Joins Naugatuck

► Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., has announced that Albin S. Krivitsky has joined its Rubber and Rubber Chemical Technical Service Department. Mr. Krivitsky has a B.S. degree in chemistry from the University of Akron. He has been associated with the rubber industry for the past 18 years, serving in the Industrial Products Division of Goodyear, and as technical superintendent for Boston Woven Hose & Rubber Co. During World War II, he served with the U. S. Army's Chemical Warfare Service, supervising the inspection of rubber and plastic protective equipment.

Marbon Chemical Names Springborn

► Marbon Chemical Division, Borg-Warner Corp., Washington, West Va., has named Dr. Robert C. Springborn manager of research. Dr. Springborn received a B.S. degree in chemistry at the University of Illinois and a Ph.D. degree in organic chemistry at Cornell University. Prior to joining Marbon, he was associated with Monsanto Chemical Co. and the Gillette Co. His principal work has been in the biosynthesis of rubber, research and development of thermoplastic resins and the use of high polymers in pharmaceutical application. He is a member of the American Chemical Society.

Enka Buys Wire and Cable Firm

► American Enka Corp., New York, N. Y., will purchase the business of William Brand & Co., Inc., Willimantic, Conn., in accordance with a diversification program begun by the company in 1957. A joint announcement by the firms states that the acquisition will be an all-cash transaction. Brand manufactures diversified types of plastic covered wire and cable for the electronics, business machine, communications, aircraft, guided missile, electrical and allied industries. The firm will continue to operate under its present management, headed by Alfred Brand, son of the founder of the company.

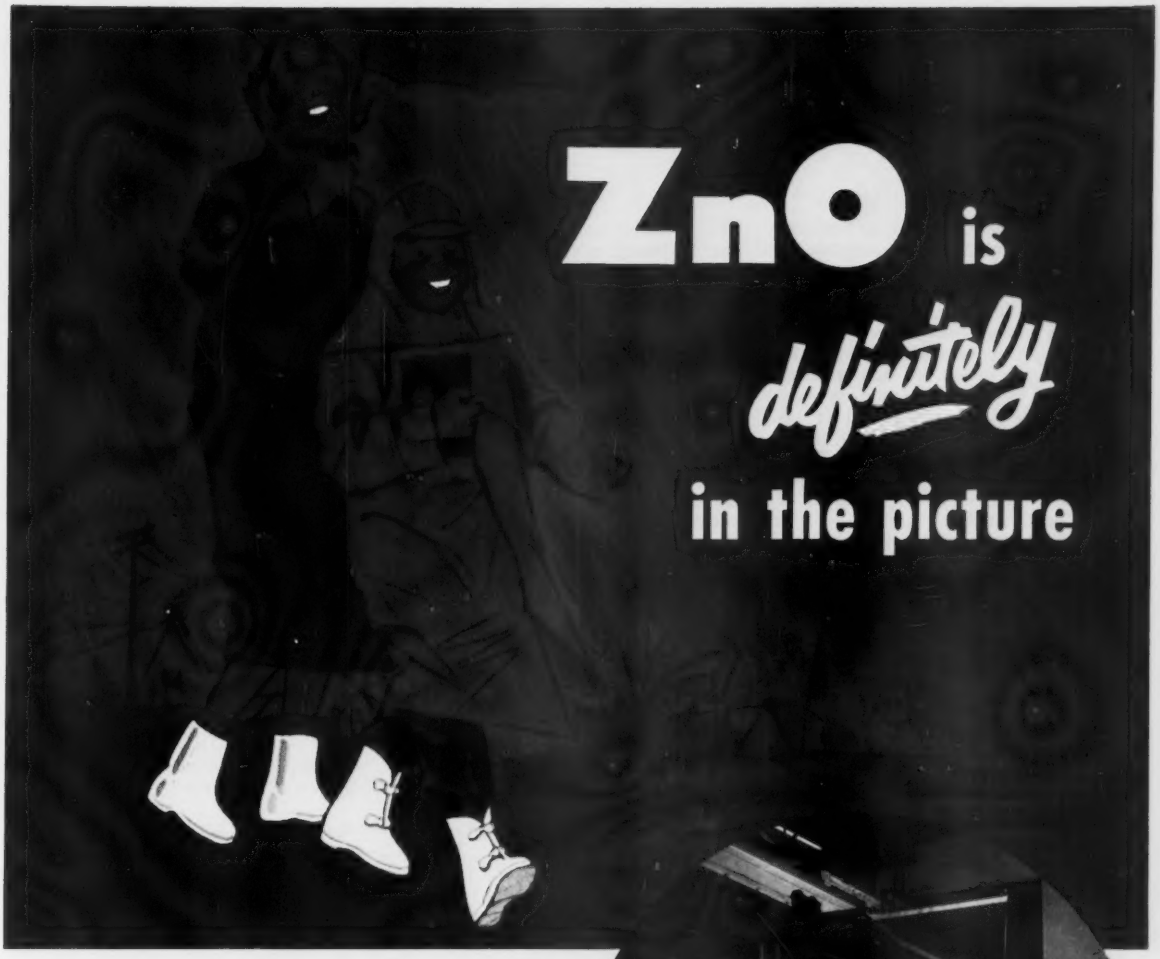
American Enka, with plants in Enka, N. C., and Lowland, Tenn., manufactures rayon and nylon for textile and industrial uses and is one of the largest producers of the new Tyrex viscose tire yarn. Last year, the company acquired the Rex Corp., West Acton, Mass., another producer of wire and cable insulating materials for the communications and electronics industries. The purchase of Brand is the second step in the firm's diversification program. A research program carried out by Brand for the development of improved materials and superior insulating techniques will be accelerated in coordination with the extensive research facilities of American Enka.

New Texas-U.S. Sales Program

► Texas-U. S. Chemical Co., New York, N. Y., has established a national marketing organization, for the sale of "Synpol" butadiene-styrene synthetic rubbers, which will be operated under the direction of William J. Burke, director of sales. This step is expected to enable the firm to employ its own experienced sales representatives in order to build a completely new and streamlined marketing organization. Five sales areas, covering the country, have been set up. For a number of months, Texas-U. S. has been making shipments from six strategically-located warehouses, and has had in operation a Supply and Distribution Department and departments handling order acceptances and acknowledgments and credit.

M-615 for Reclain Process

► Midwest Rubber Reclaiming Co., East St. Louis, Ill., is offering M-615 for extrusion with GR-S 1805 oil-black masterbatch, which is reported to give improved processing and smooth, extruded, open steam cured rubber goods of excellent quality. According to the company, tests have revealed that M-615 is completely compatible with a GR-S oil-black masterbatch; extrusion speed is increased 80 per cent by the use of M-615 as replacement for a part of the GR-S; swell is reduced about 17 per cent; and its use results in savings in volume cost.



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West Coast News

► Tlargi Rubber Technology Foundation has announced its fall schedule of courses at the University of Southern California. The Foundation will offer one non-credit course, *Chem. Eng. 442*, a lecture course entitled "Basic Rubber Technology" to be conducted by L. E. Peterson. Designed for non-technical personnel or for orientation of new technical personnel, there will be no prerequisites. The classes will meet on Thursdays from 7 to 10 p.m. There will be a fee of $25 and registration will take place at the first session of class, on October 1.

Three credit courses will be offered. The first, *Chem. Eng. 442*, "Rubber Technology I", is a lecture course offering 2 units, which will be taught by Dr. E. G. Partridge. Designed for chemical engineering curriculum students and for technical personnel in industry, the prerequisite is "Elementary Organic Chemistry". The class will be held on Wednesdays, from 7 to 8:40 p.m. and there will be a fee of $50.

Chem. Eng. 443aL, "Rubber Technology Lab", offers 2 units and will be taught by Mr. Larkin. The prerequisite for this course is "Elementary Physics". Class meets on Mondays from 6:15 to 10 p.m., and the fee will be $50.

Chem. Eng. 445L, "Latex Technology" will be taught by Dr. Partridge and offers 2 units. While it is listed in the University Catalogue as a laboratory course, in response to requests, it will be given as a lecture-demonstration course. The prerequisite is "Rubber Technology I" or its equivalent. Classes will meet from 7 to 8:40 p.m. on Thursdays and the fee is $50.

Registration for credit courses takes place September 16 to 19 and classes begin during the week of September 21. For details on the above courses, contact Dr. E. G. Partridge at the University of Southern California.

A $3500 Fellowship was recently established by the Foundation for full time graduate work in the field of rubber or elastomers toward an M. S. degree in chemical engineering at the University of Southern California. The first award of this fellowship for the year 1959-1960 has been made to Edward Falkard, who is to receive his B. S. degree in chemical engineering at the University of Southern California in June, 1959. Mr. Falkard, who is 20 years old, has a fine scholastic record. He is a member of A. I. Ch. E., Tau Beta Pi, Phi Lambda Upsilon and Phi Kappa Phi.

A $500 Scholarship has been provided by the Tlargi Memorial Fund for the academic year 1959-1960. Payable in equal installments of $250 at the beginning of each semester, the scholarship will be offered to students interested in the rubber industry, who will be full-time juniors or seniors in the fall, 1959 semester. It is expected that such students will take at least one of the rubber technology courses offered by the Department of Chemical Engineering at the University of Southern California. Consideration will be given to both merit and financial needs in awarding the scholarship. Applicants should submit a resumé of pertinent information to the Head of the Department of Chemical Engineering before May 15, 1959.

► The Los Angeles Rubber Group, Inc. held a dinner meeting, sponsored by the W. J. Voit Rubber Corp., on April 7 at the Biltmore Hotel. Guest speaker at the meeting was Arthur E. "Red" Patterson, director of public relations for the Los Angeles Dodgers. During the technical meeting, which was held at 6 p.m., Ross E. Morris (Mare Island Naval Shipyard) spoke on "The Effect of Nuclear Radiation on Rubbers."

According to Mr. Morris, nuclear radiation forms free radicals or ions in rubber which react either to create more crosslinks in vulcanized rubber or to depolymerize the vulcanizate. The former reaction causes hardening of the rubber while the latter causes softening. Various investigators have shown that crosslinking predominates in most rubbers. Examples of rubbers which are depolymerized by radiation are butyl rubber and Thiokol.

The vulcanized rubbers which have the best retention of tensile properties are natural, styrene-butadiene and acrylonitril-butadiene in the order named, according to published information. The vulcanized rubbers which have the best resistance to compression set engendered by nuclear radiation are natural, styrene-butadiene, and carboxylic derivatives of acrylonitrile-butadiene.

Tlargi plans to hold a meeting, May 13 to 15, at the Biltmore Hotel in Los Angeles, Calif. The three day event will be highlighted by the presentation of technical papers, plant tours and a banquet. Registration will take place on Wednesday, May 13, and will be followed by the 25-Year Club luncheon. Technical papers will be presented on Wednesday afternoon, Thursday and Friday mornings. Plant trips to the Shell Chemical Corp. SBR plant and possibly the Douglas DC-8 plant in Long Beach, have been scheduled for Thursday.

The group will also have a banquet at the Beverly-Hilton Hotel on May 14, preceded by a "Champagne Ride" in well provisioned buses via local points of interest for guests staying at the Biltmore. Ladies entertainment will consist of a guided tour of Disneyland and a fashion show at the Disneyland Gourmet Restaurant on Thursday.

► C. P. Hall Co. of Los Angeles has been appointed sales agent in five western states for Synpol butadiene-styrene synthetic rubber produced by the Texas-U. S. Chemical Co. C. P. Hall has its main offices and a warehouse at 1340 East Sixth Street in Los Angeles. A second warehouse in Oakland, Calif., services the Oakland-San Francisco area. In addition to California, the company will handle sales of Synpol in Washington, Oregon, Utah and Colorado.

The two additional warehouses bring the total number of warehouses from which Synpol is now being shipped throughout the country to seven. The West Coast firm also maintains a complete rubber laboratory in Akron, Ohio. Under the sales agent agreement, this Akron laboratory will be available to Texas-U. S. for technical service. Texas-U. S. maintains its own laboratories for research and development and technical service in Parsippany, N. J.

► Alex J. Keller has been named manager of manufacturing for the Oliver Tire and Rubber Co., Oakland, Calif. Mr. Keller, a mechanical engineer, is a graduate of Ecole Politechnique de Roumaine, Bucharest, Roumania. He was formerly plant manager for the Chardon Rubber Co., and engineering director in charge of design and field installations for Stewart Bolling. Mr. Keller was also with General Tire's International Plant Division. He has designed and built rubber plants in Israel, Canada and Brazil.

► Bulk facilities in Los Angeles for vinyl acetate polymers and copolymers have recently been established by the Dewey and Almy Chemical Division of W. R. Grace & Co. By arrangement with the Gray Truck Co., Los Angeles, bulk storage tanks are in service, and direct deliveries may now be made in tankwagons or in drums to points in Southern California. The new bulk station is located at 4280 Bandini Road, Los Angeles.

► Ed J. Lynch has been appointed sales representative for the Davis-Standard Division of the Franklin Research Corp., Mystic, Conn. Mr. Lynch will handle the complete line of Davis-Standard thermoplastic extruders and wire machinery in California, Oregon and Washington. The appointment, which is effective immediately, provides an exclusive sales organization for Davis-Standard machinery on the West Coast.

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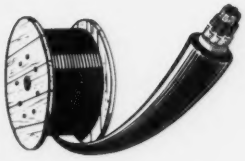

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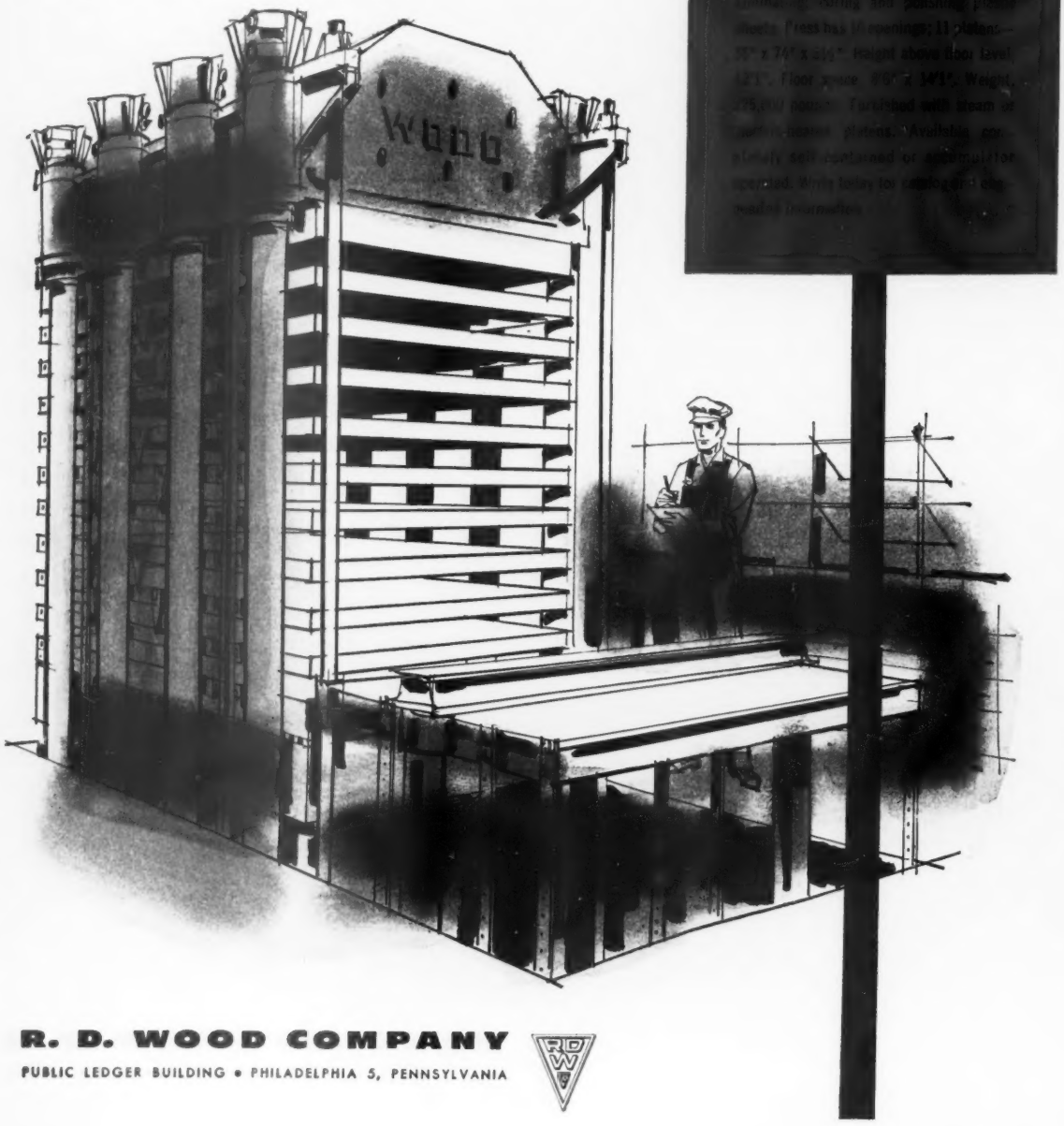

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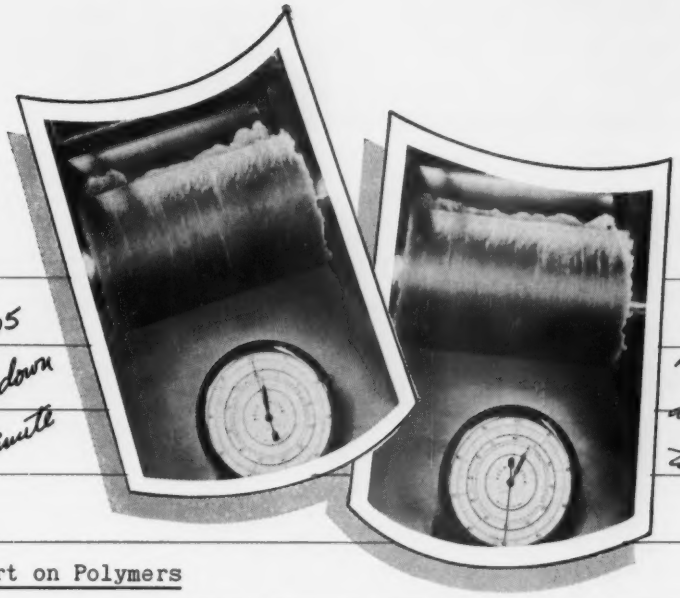

Report on Polymers

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BREAKDOWN STEP IN PROCESSING

Photographs above show how ASRC 3105 gives head start over competitive polymer 1502 in processing. Rubber and fillers can be introduced simultaneously without breakdown time before mix — with considerable savings in processing time and reduced power costs.

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1. Absorbs 20–30% more fillers
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Canadian News

Berkinshaw

Spencer

► Leland E. Spencer has been named president of Goodyear Tire & Rubber Co. Ltd. of Canada, succeeding R. C. Berkinshaw, who has been named chairman of the board of directors. Mr. Spencer joined Goodyear in Akron, Ohio, in 1926 and has had a variety of assignments, including three leaves of absence to hold U. S. Government posts. During World War II, he served in the rubber director's office and later became deputy director. In 1949, he became vice-president of the Kelly-Springfield Tire Co. in Cumberland, Md., a Goodyear subsidiary. In 1956, he was named a vice-president of Goodyear in Akron. Mr. Spencer was appointed executive vice-president of Goodyear in Canada in March, 1958. Mr. Berkinshaw joined the Law Department of the Canadian firm in 1920 and in 1921 was made assistant secretary. He was named secretary and general counsel in 1926, and later became assistant to the president and then treasurer. In 1942 he was appointed president of the Polymer Corp., where he served until 1945. Since 1952 he has served as president and general manager of Goodyear in Canada.

► Canadian tire manufacturers are hitting one of the fastest production paces in history with sales of all classes of tires in the first three months of 1959 up 43 per cent over the same period last year. The volume for 1958 was the largest on record with 8,061,000 units, and if the last nine months follow the trend, a new record volume will be recorded. Sales of passenger tires jumped 22 per cent so far; bus and truck tires have risen 29 per cent; and implement and tractor tire sales are up 26 per cent. However Canada's seven tire manufacturers see little relief from sharp competitive conditions that have pared profit margins and hit earnings over the past year. The recent average five per cent price hike in all tires and tubes initiated by Goodyear of Canada, and followed in varying degrees by other tire makers, has been the first general tire increase since July, 1955. According to Goodyear, the price increase was based on accumulated costs of materials, labor, taxes and other cost of doing business.

► The Canadian Rubber Footwear Information Office has reported that markets, domestic and foreign, are disappearing for Canadian rubber footwear manufacturers. According to the Information Office, just 10 years ago there were virtually no imports of shoes into Canada and Canadian manufacturers were shipping substantial quantities to other countries. However, today the export business is gone and imported shoes flood the country with steadily increasing volume. According to estimates, imports in 1958 of rubber soled canvas footwear supplied 61.3 per cent of the Canadian market, while waterproof rubber footwear imports took 17.3 per cent of the market.

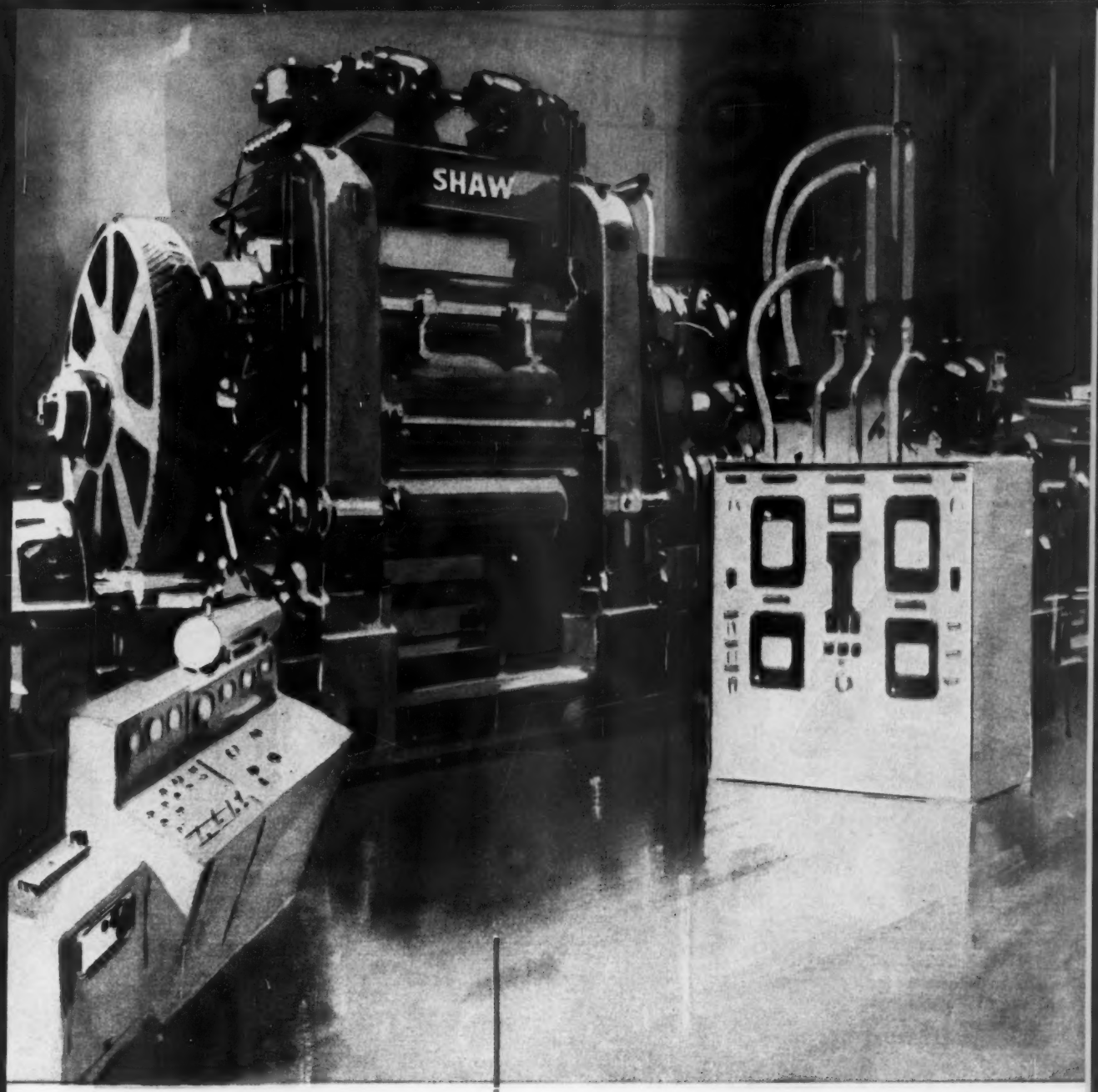
The Information Office states that the big rise in imports has been due to major pushes from Japan and Communist countries. Japan's shipments to Canada of rubber shoes in 1958 were 744,000 pairs, up from 323,000 the previous year. In canvas shoes, Japan's share jumped from 110,000 pairs in 1957 to 660,000 last year. China, starting with 2,160 pairs of rubber footwear two years ago, shipped 86,000 pairs in 1958. The industry estimates that labor accounts for 50 per cent of total manufacturing costs, and its disadvantage is due to its high wage levels as compared with those of other countries.

► Continental Rubber Ltd., Edmonton, Alberta, has opened the first Canadian prairie province rubber plant. The new plant produces molded rubber items and extrusions from both natural and synthetic rubber. Continental Rubber is a privately-owned company and represents an investment of over $260,000, including a $160,000 building with 12,000 square feet of floor space, and $100,000 worth of equipment. Continental supplies the oil drilling and producing industry with a large number of rubber items. Many of these items are not produced elsewhere in Canada. The company does custom work since it is equipped to manufacture almost any rubber product. The firm uses molds to turn out rubber products in a wide variety of sizes and shapes. By molding rubber to metal, solid rubber tires and wheels, motor mounts and bumper blocks are produced. Continental manufactures an almost unlimited range of rubber extrusions, including those with the most intricate shapes. W. B. Smith is president of Continental Rubber, N. H. Smith is comptroller and C. H. Loeber is vice-president and general manager.

► The Ninth Canadian High Polymer Forum, originally scheduled for October 19-21, will be held on October 26-28 at the Guild Inn, Toronto, Ont. Dr. C. H. Bamford, Courtaulds Research Laboratory, Maidenhead, England, will be the guest speaker at the Forum banquet. Authors wishing to submit papers for presentation should write to: Programme Chairman, Dr. L. A. McLeod, Research and Development Division, Polymer Corporation Ltd., Sarnia, Ontario, Canada. Titles and abstracts of approximately 300 words will be required by August 1. General information concerning the Forum may be obtained by writing to Dr. M. H. Jones, Chairman, Ninth Canadian High Polymer Forum, Ontario Research Foundation, 43 Queen's Park, Toronto 5, Ontario, Canada.

► Hooker Chemicals Ltd., North Vancouver, British Columbia, a subsidiary of Hooker Chemicals Corp., has named George E. Gentes to succeed F. Leonard Bryant as a vice-president and director. Mr. Gentes recently was named production manager for the company's Western Chemical Division, while Mr. Bryant has been appointed general manager of the Phosphorus Division. The company also announced that Edward M. Mathias, recently elected treasurer of Hooker Chemical Corp., replaces as treasurer and director Thomas F. Willers who has been named Eastern Chemical Division general manager.

Continental Rubber opens first Canadian prairie province rubber plant.



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OVERSEAS AGENTS THROUGHOUT THE WORLD

Obituaries

E. Glenn Reed

► E. Glenn Reed, Akron scientist and inventor who was formerly in the Research Department of the Goodyear Tire & Rubber Co., Akron, Ohio, died on December 3 in City Hospital after a year's illness. Born in West Lebanon, Ohio, Mr. Reed was graduated from Wooster College in 1914 with a B.S. degree. He taught school for a time and in World War I, was with the Chemical Warfare Bureau of Standards in Washington, D. C. Associated with Goodyear in research and salary control for 25 years, Mr. Reed, in 1935, started his own company, Reed Laboratories, Inc., of which he was president and research director.

Working in the Research Department at Goodyear, Mr. Reed discovered by accident that plastic can be used as a pain killer. He was injured when a roll of stock fell and broke several bones in his foot. He grabbed some nearby pliofilm and wrapped it around his foot. The pain disappeared. Mr. Reed experimented further with the film when he set up his own laboratory. His firm was also among the suppliers for the new atomic submarine Nautilus. He had many inventions and wrote a number of scientific articles which were internationally known. As an inventor and director of Originality House, an organization designed to help inventors develop their ideas, he knew the techniques of original thinking. Mr. Reed was a member of the Cleveland Engineering Society and the American Association for the Advancement of Science. He is survived by his wife and two daughters.

C. Vaughn Castor

► C. Vaughn Castor, chief chemist and a director of the Brown Rubber Co., Lafayette, Ind., died on March 3 in Hahnemann Hospital in Philadelphia, Penna. He was 52 years old. Born in Lockport, N. Y., he lived in Lafayette 37 years, and in 1937 graduated from Purdue University with a bachelor's degree in civil engineering. He had been with Brown Rubber since 1933. Mr. Castor was a member of the Elks Lodge 143, Chamber of Commerce, Kiwanis Club, American Chemical Society, Ft. Wayne Rubber and Plastics Group and the Chicago Rubber Group. He is survived by his wife and two sons.

James I. Simpson

► James I. Simpson, chairman of the board of Dunlop of Canada, Ltd., died on November 14 in Toronto, Ontario. He was 73 years old.

John E. Bassill

► John E. Bassill, president of American Enka Corp., died on March 17 at his home in New Rochelle, N. Y. He was 62 years old. He was born in Norristown, Penna., and graduated from the Wharton School of Finance and Commerce of the University of Pennsylvania. During World War I, he served as an aviator in the Marine Corps. In 1920, he started in the textile industry as an accountant with the Tubize Artificial Silk Corp. In 12 years he worked his way to the presidency of the firm and held the post for 14 years. In 1946, the Celanese Corp. of America took over Tubize and Mr. Bassill became vice-president and a member of the board of directors. Also in 1946 he was named president of American Bemberg Corp. and its affiliate, North American Rayon Corp. He joined American Enka as a consultant in 1948 and was named president in 1950. Mr. Bassill was a member of the Wykagyl Country Club in New Rochelle, and the Union League Club. He is survived by his wife and a daughter.

Paul H. Dixon

► Paul H. Dixon, manager of the General Metal Products Division for the General Tire and Rubber Co., Cuyahoga Falls, Ohio, died on February 18 in St. Thomas Hospital. He was 56 years old. Mr. Dixon, a native of Pittsburgh, Penna., had been in the manufacturing engineering field since the conclusion of his studies at Carnegie Tech and the University of Pittsburgh. He joined General Tire in 1951, and before he was appointed manager of the Cuyahoga Falls plant in 1955, he was plant superintendent of Aerojet-General's Cincinnati Division. As head of the Cuyahoga Falls plant, he supervised the manufacture of machines for the production of aircraft wheels, special rubber machinery, industrial wheels, tools and dies, and molds for rubber and plastic materials. He is survived by his wife, three daughters and a son.

Robert S. Jane

► Dr. Robert S. Jane, president of Shawinigan Chemicals, Ltd., Montreal, Canada, died on December 1. He was 59 years old. Dr. Jane became executive vice-president of the company in 1954 and president two years later. He was also a director of the parent firm, Shawinigan Water and Power Co. He was president of the Chemical Institute of Canada from 1952 to 1953 and chairman of the Canadian section of the Society of Chemical Industry in 1957.

Jerome Alexander

► Jerome Alexander, consultant chemist, chemical engineer and author, died on January 18 in Lenox Hill Hospital, New York, N.Y. He was 82 years old. Mr. Alexander was born in New York City and was a graduate of City College. From the beginning of his career, his interests centered on colloidal substances, such as glues, gelatin, sizings and color. During World War I, Mr. Alexander was chairman of the National Research Council's Special Committee on Glue and Other Colloids. In 1917, he helped to found the New York Section of the Societe de Chimie Industrielle, and was for many years its secretary.

Mr. Alexander's first published work was a translation from the German of Richard Zsigmondy's "Colloids and the Ultramiscroscope." In 1919, he published his own work, "Colloid Chemistry," and followed with "Colloid Chemistry, Theoretical and Applied," in seven volumes, which he edited along with about 500 authors. In 1931, the French Government cited him for services to science and decorated him as Officier de l'Instruction Publique; and in 1936, as a Chevalier of the Legion of Honor.

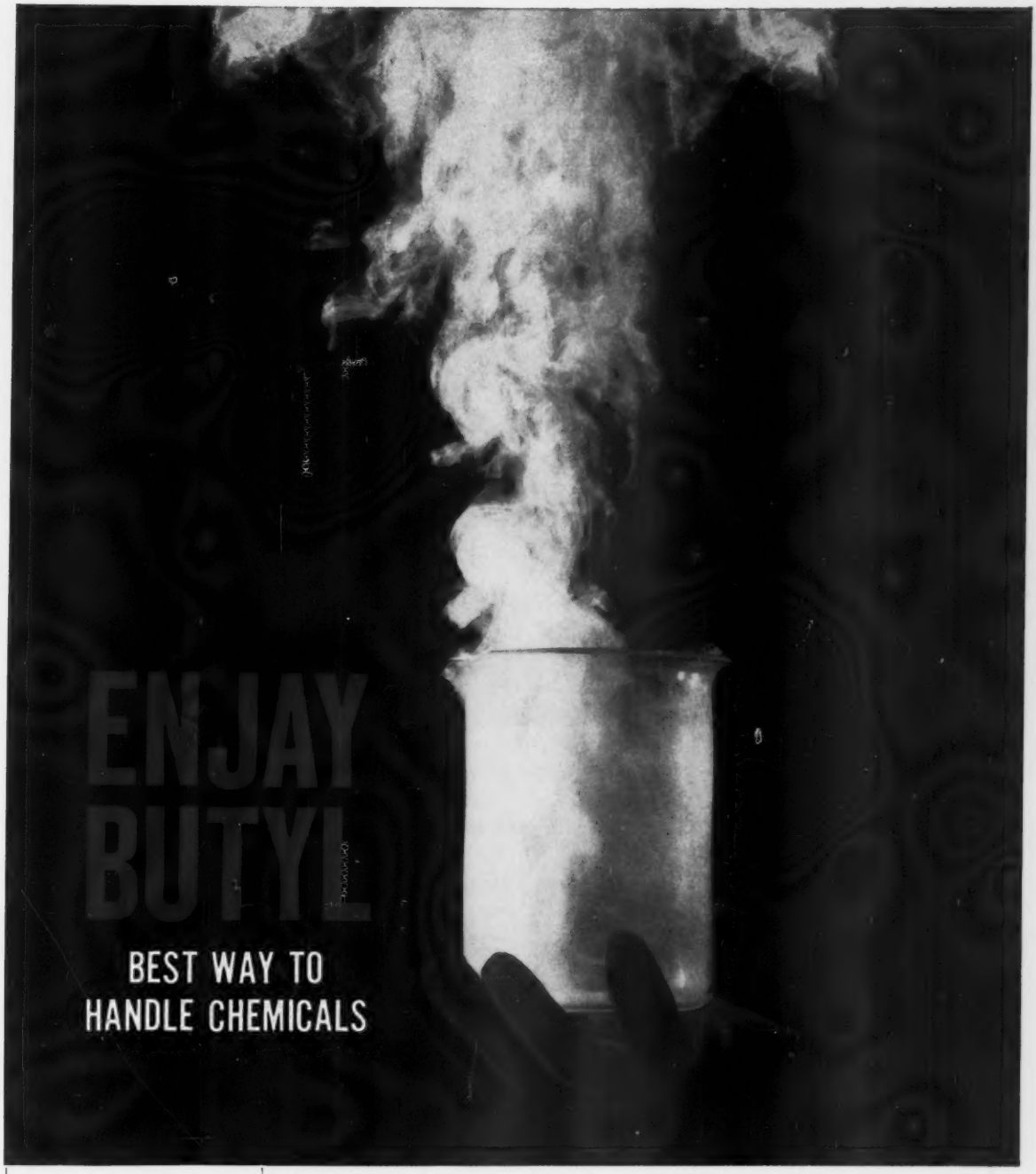
City College, Mr. Alexander's alma mater, gave him the Townsend Harris medal in 1943 as consulting engineer and a pioneer experimenter in the ultramiscroscope. In 1951, he was awarded an honorary membership by the American Institute of Chemists for being a "distinguished American scientist of world-wide renown." Mr. Alexander was a fellow of the American Association for the Advancement of Science and a member of many scientific groups. He is survived by a daughter and grandson.

L. E. Carpenter

► Laurence E. Carpenter, founder and board chairman of L. E. Carpenter & Co., died on December 2 at his home in South Orange, N. J., after a long illness. He was 67 years old. Mr. Carpenter was a leader in the development of deep-embossed vinyl materials and he helped to develop impregnated fabrics for the bookbinding trade. He also helped to establish the impregnated duck program in World War II, for which his company received the Army-Navy "E" award. He is survived by his wife, a son and three daughters.

Walter J. Binder

► Walter J. Binder, retired manufacturer of floor coverings, died on April 22, in Paul Kimball Hospital in Lakewood, N. J. He was 74 years old. Mr. Binder was the founder of the Delaware Floor Products Co. in Wilmington, Del. In 1949, he sold the business to Congoleum-Nairn, Inc. He is survived by his wife and two daughters.



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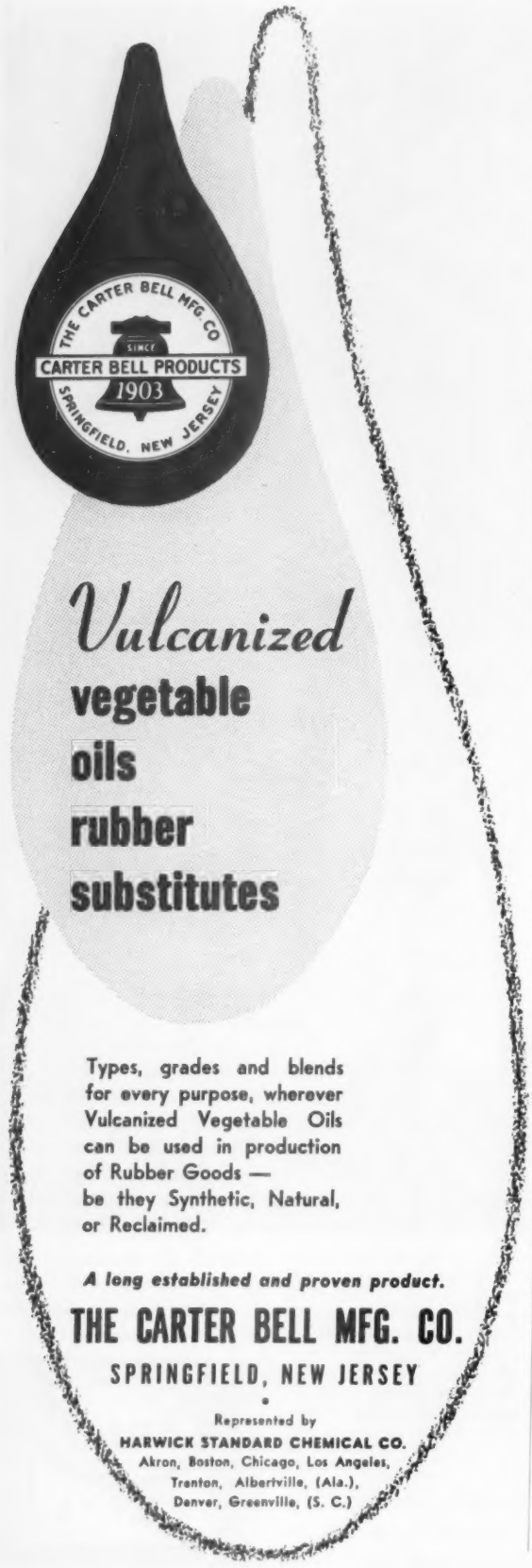
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Overseas

Paris—Goodyear Tire and Rubber Co. plans to construct a $7 million manufacturing plant in France. The company is now studying site locations in that country and a decision is expected shortly as to plant location. The new facility will be the first such unit in that country to be built and owned by an American tire manufacturer.

Rome—Montecatini has announced completion of license agreements for the industrial exploitation, in the United Kingdom by Imperial Chemical Industries and the Shell Chemical Co., of the Montecatini and Montecatini-Ziegler patents covering the production of polypropylene for plastic uses. Plant construction is scheduled to begin immediately.

The Hague—Continental Carbon Co. plans to construct a carbon black plant at Rotterdam in the Netherlands. Expected to cost approximately $2,500,000, the plant will have an initial capacity of 15,000 tons of high abrasive carbon black. Completion is expected early in 1960.

Kuala Lumpur—Bridgestone Tire Co., Ltd., one of Japan's largest auto tire companies, plans to set up a factory in Malaya. The project would be a joint Japanese-Malayan capital investment venture set up under Malaya's Pioneer Industries Ordinance. Japanese technicians would supervise initial operations at the plant, while Malayans would be sent to Japan for training.

New Delhi—A new rubber tire factory went into production recently at Ambatur, located eleven miles from Madras City. The first of two factories recently sanctioned by the government of India, the factory will produce tires for trucks, buses and bicycles. Retreading work, principally for the South Indonesian market will also be done.

Kuala Lumpur—The National Union of Plantation Workers has proposed that a closed shop system be initiated. It is believed that if the proposal is accepted, all of the 320,000 estate workers in that country will be brought into the Union's books. Workers' dues, to be collected on a monthly basis, would be collected by employers on behalf of the Union.

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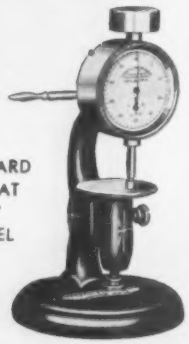

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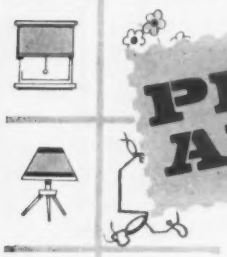

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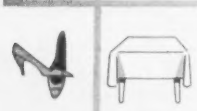

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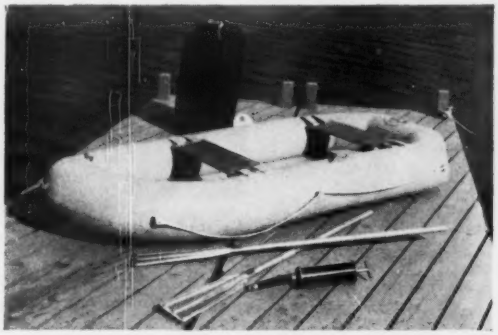
New Goods

Duffle Bag Dinghy

► U.S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., has introduced a boat that can be carried in a small case and inflated in seconds. The boat measures 8½ feet when inflated. It is constructed of neoprene-coated nylon fabric to give long shelf life, and a special coating gives extra protection against ozone action,



the company reports. The floor is also inflatable, providing unusual stability, rigidity and insulation against cold water, the company states. The dinghy comes equipped with two folding aluminum paddles, a hand pump and two seats. Optional equipment includes a motor mount on which to attach a 1.7 horsepower outboard motor, and a carbon dioxide bottle for quick inflation. The boat's carrying case is 35 inches long, and has a circumference of 14 inches. The entire unit weighs 42 pounds.

Portable Sleeping Equipment

► Portable sleeping equipment consisting of the "Karpak Sleeper", which can be installed on the roof of a car, and the "Karpak Porch", which fits over the opened rear deck area of a station wagon, is being marketed by Firestone Tire & Rubber Co., Akron, Ohio. According to the company, the Karpak Sleeper is a sturdy, water-repellent canvas tent supported by a collapsible metal frame. It is fastened to the roof of a car by eight suction cups and four safety straps. A five-foot, lightweight steel ladder is used for climbing in and out of the sleeper. The sleeper platform is 6½ feet long and accommodates a double bed mattress. A canvas cover protects the collapsed tent when not in use. The sleeper can also be used on the ground. For station wagon owners, the Karpak Porch provides 30 per cent more usable sleeping area, the company states. It is also water-repellent and fits snugly over the opened rear doors of station wagons.

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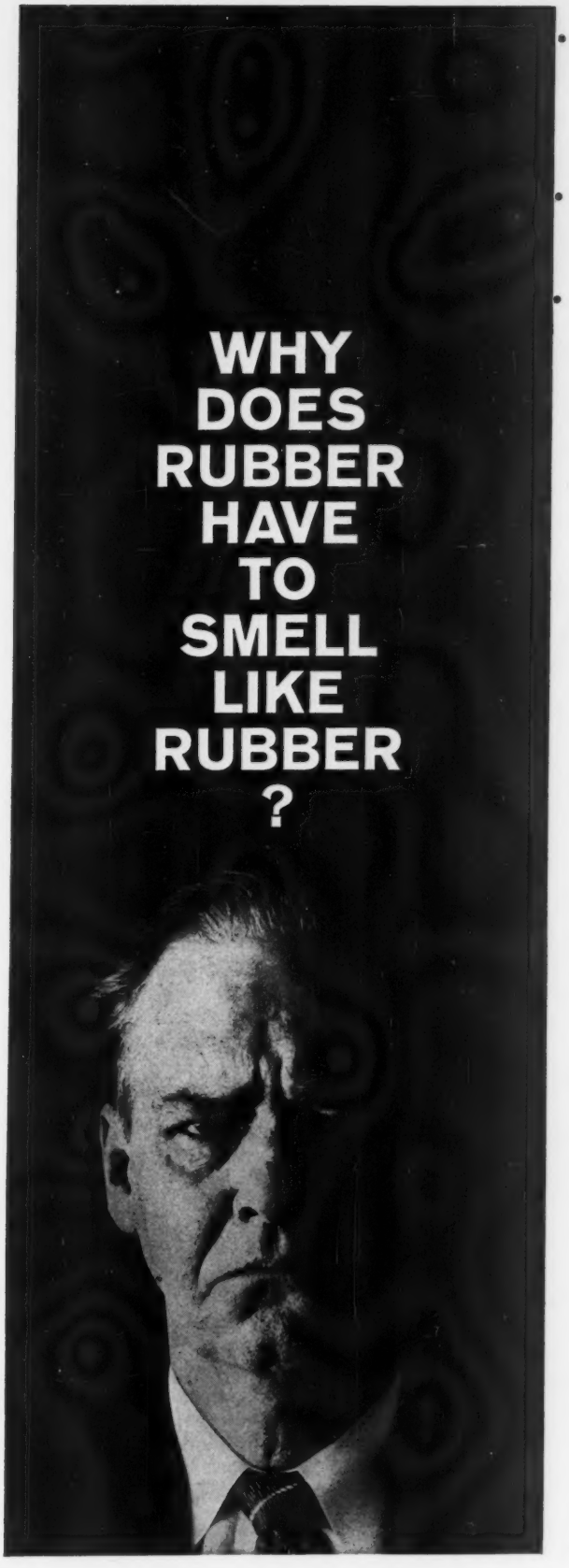

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Pin Core Foam Cushioning

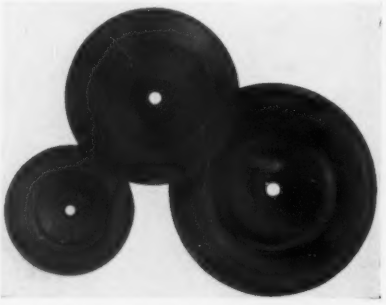
► U.S. Rubber Co., 1230 Avenue of the Americas, New York, N. Y., has introduced a new line of pin core foam cushioning that is reported to compete in price with polyether foam, for use as backs and seats on furniture. According to reports, the new pin core foam will be available in blocks four inches or three inches thick in soft, medium and firm densities, with the four inch blocks being manufactured in 78 inch lengths and in six widths—21, 22, 23, 24, 27 and 31 inches; and the three inch blocks, also 78 inches long, in 31 and 33 inch widths. The company states that the pin core cushioning is made by a closed mold process which guarantees uniform compression in the cushioning as well as full sizing, and each block has thousands of small core holes on top and bottom, making the cushioning easy to handle for upholstery.

Butyl Rubber Coating

► Montgomery Ward, Chicago, Ill., is marketing a butyl rubber coating which can be rolled or brushed on a leaky roof. The company guarantees that the coating will seal the roof tight against leaks for up to 15 years. The rubber has a vulcanizing effect and the coating also contains aluminum flakes to reflect sun in summer and retain heat in winter, the company states. The coating comes in red, brown, green and aluminum.

Diaphragm Seals

► Precision diaphragm seals for aircraft, missiles and rockets, at temperatures ranging from —65°F. to 500°F., are now being produced by Pacific Moulded Products Co., 905 E. 59th St., Los Angeles, Calif. The company reports that special silicones compounded for diaphragm applications



are combined with popular fabrics such as Dacron and Fiberglas to provide precision diaphragms with virtual immunity to a broad spectrum of chemical and physical environments. Produced to customer's requirements, the diaphragms retain their shape and resist deterioration, and provide outstanding performance over a long service life, according to the company.

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LATE SOLVENT SHIPMENTS ARE SLOWING US DOWN, BUT I'LL FIND THE ANSWER...OR A NEW PURCHASING AGENT!!

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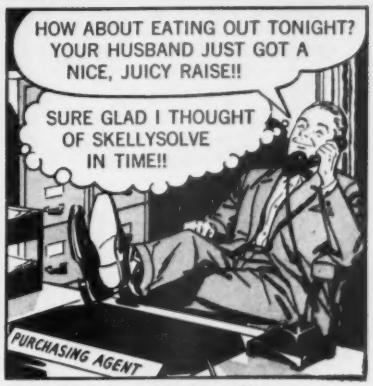
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Vulcanized Safety-Shoe

► Record Industrial Co., 3301 Arch St., Philadelphia, Penna., is marketing a safety shoe which has a "welded on" neoprene sole eliminating stitches which usually wear out, rot or carry moisture through to leather linings. In the new shoe, neoprene soles and heels are vulcanized as one unit in a lasting bond directly to the leather uppers, and no nails are used in sole or heel. In addition, the construction eliminates the gummy filler used between conventional soles and insoles, removing the cause of lumps inside the bottoms of the shoes. Because the high temperature and pressure of the vulcanizing process require a special, durable compound, the heels and soles contain an especially high level of long-wearing neoprene. The company reports that safety features include a steel box toe and a heavy steel shank under the arch. The sole pattern is designed to combine high traction, long wear life and comfort in use, the company states. The special neoprene soles are manufactured by Safety First Shoe Co., Water St., Holliston, Mass.

Pioneer Nimble Fingers

► A new lightweight glove for painting, called "Nimble Fingers", has been introduced by the Pioneer Rubber Co., Willard, Ohio. The glove is tissue-thin, liquid and paint proof, and its non-binding design and finger touch sensitivity gives the wearer bare-hand comfort and smooth fit, according to the company. Made of Pylox, a special vinyl compound, Nimble Fingers has unusually high non-allergic properties. The sheer, feather-light material makes it easier to slip on and off. When a non-slip grip is required, Nimble Fingers can be turned inside out so the textured surface provides the necessary sure hold. The glove is available in small, medium and large sizes.

Durofyne 2-Ply Custom Green

► A new 2-ply offset blanket has been added by the Vulcan Rubber Products Division of Reeves Brothers, Inc., New York, N. Y., to its line of Durofyne blankets. Designated "Durofyne 2-ply Custom Green", the new 0.055 inch gauge blanket can be supplied in widths up to 77 inches. The blanket is recommended for use with Waldron web fed presses, certain duplicating machines using blankets 0.055 inch thick, and a number of other special applications. It is not intended for standard presses on which 3-ply blankets are normally used. The Vulcan line now consists of nine different grades including four Duroflex grades and five Durofyne grades. The Durofyne line was first introduced in 1958.

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UNION CARBIDE TRADE-MARK SILICONES

In an effort to better facilitate its purchasing procedure, Bristol Manufacturing Corporation has arranged to have Mr. David Boehm, company representative in New York, interview all suppliers of items used in the manufacture of fabric and waterproof footwear.

Mr. Boehm will be available on Tuesdays in the office of Bristol Manufacturing Corporation, Marbridge Building, 47 West 34th Street, New York City.

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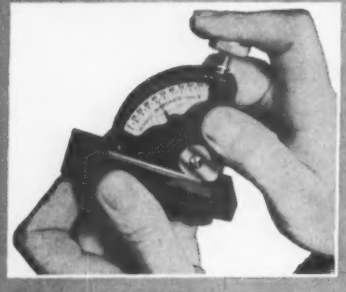

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The Shore Durometer is available in various models for testing the entire range of rubber hardness and is furnished complete with standard spring block and carrying case.

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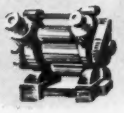
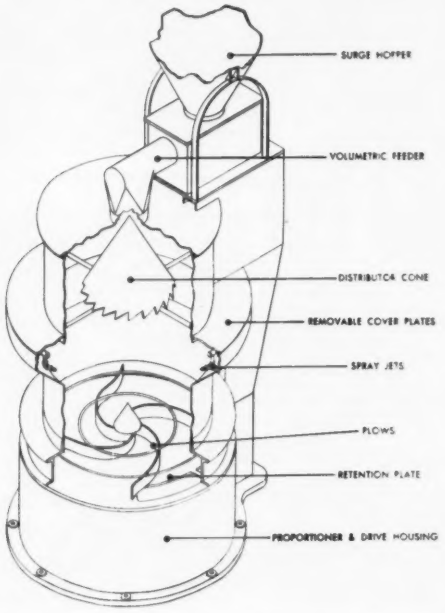
Manufacturers of the "Scleroscope," for testing the hardness of metals.

New Equipment



Johnson-March Continuous Blender

► A new continuous-flow blender, developed by Johnson-March Corp., 1724 Chestnut St., Philadelphia 3, Penna., is said to accurately proportion, mix, blend and discharge a wide range of dry materials, or to blend liquids with solids in precise



quantities. The blender, called the Verticone, is said to be applicable to a wide variety of applications in the tire and rubber industries, including blending and mixing of dry materials, addition of sulfuric acid and other chemical reagents to rubber, addition of carbon black, as well as control of dust created by unloading or discharging carbon black, sulfur and other raw materials from bins and silos. Materials to be treated or blended are fed proportionately into the machine via controlled volumetric feeding equipment. Spray headers can be provided to disperse any desired liquid into the blended mixture in any proportions required.

Mount Hope Expander

► A ⅞-inch diameter expander, manufactured by Mount Hope Machinery Co., Taunton, Mass., is used to keep cloth tape and other narrow width webs at full width and free from wrinkles and creases during processing. In operation the rotating bow-shaped roll of the unit imparts an even width-wise stretch to the web, keeping it taut and smooth. The company's expanders are available in roll lengths from one to 320 inches.

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BALE CUTTER

Tested at 3 times normal operating pressure, the Goodman Crude Rubber Bale Cutter has proved dependable and economical for many years. It can cut frozen bales easily, as well as narrow slices to obtain correct loads. Controls are located high for safety . . . unit stops and holds instantly on release. Its low overall height permits a basement set-up, if necessary. Optional choices include Bale Cutter separately, as well as 2, 5, or 7½ HP motor driven pumping units, with proportionally faster cutting cycles. Units power-tested before shipping.

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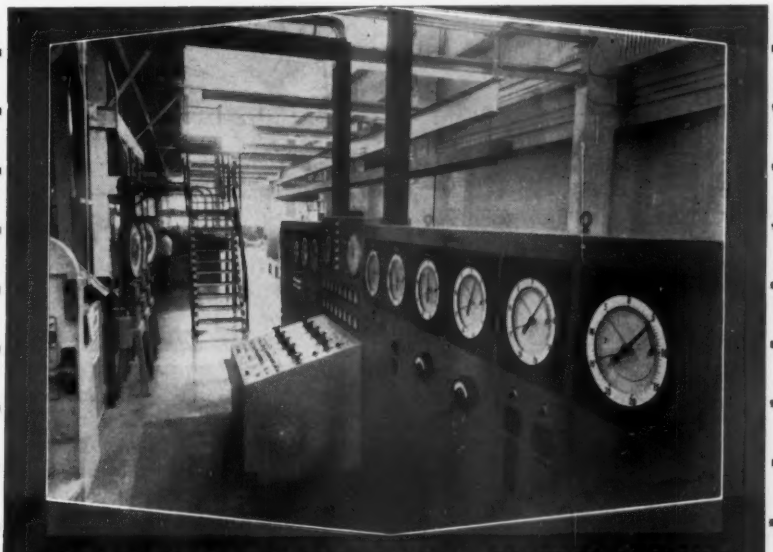

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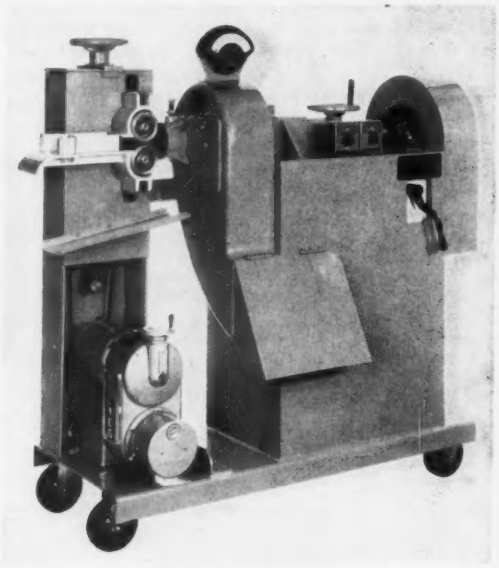
PASADENA HYDRAULICS INC.

1433 Lidcombe, El Monte, California

Improved Goodman Rubber Slug Cutter

► A new gearshift model of the rubber slug cutter manufactured by G. F. Goodman & Son, 401 Richmond St., Philadelphia 25, Penna., features a speed cutter head controlled by a 3:1 variable speed motor and a four-speed gear box. This drive will deliver 50 to 600 slugs per minute with one blade mounted in the cutter head, or 100 to



1200 slugs per minute with two blades. A feed roll speed control wheel on top of the Reeves Motor drive varies the feed rate of stock between 180 and 1800 inches per minute. Stock capacity is up to 3 inches in diameter. Adjustable guides are provided to direct the stock into the feed rolls. The cutter comes in two designations: 3-4, which produces slugs in the 3/16 to 4-inch length, and 3-12, which manufactures them in the 3/16 to 12-inch range. The machine, which uses the principle of a rotary blade, is designed to provide continuous production from extruder to tote box. Time wasted in coiling, stacking and cooling before cutting is eliminated. Since the operation is timed to extruder delivery, a size change-over on the cutting equipment consumes only the amount of time necessary to change an extruder die.

To facilitate calculations for slug length, the machine is equipped with a dial graduated in inches per minute on the power feed. For complete accuracy, an electric tachometer is available which can be attached to the cutter head spindle. This attachment gives a direct reading in cuts per minute using single or double blades. A large reference chart is furnished to show the necessary dial settings for any length slug within the range of the machine. The unit is 60 inches long, 32 inches wide and 59 inches high.

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POLYSAR KRYNACS

The non-staining properties of Polysar* Krynac (nitrile) rubbers have been markedly improved and the raw polymer colour has been lightened. These improvements, together with the inherent advantages of easy processing and relatively low water absorption, provide the best balance of properties in oil resistant rubbers.

Polymer Corporation Limited has been producing Polysar Krynac . . . "cold" nitrile rubber . . . since 1949. This production experience is unmatched by any other supplier. The current program of polymer improvement emphasizes their leadership in the field.

Many applications requiring varying degrees of oil resistance have been launched by the adoption of one of the Polysar Krynac types. In the past these have usually been black compounds. More recently compounders have turned to Polysar Krynac as the base polymer for coloured compounds —notably in the development of oil and heat resistant industrial shoe soling and smooth, flame-resistant cable jackets. In both black and coloured compounds Polysar Krynac has improved the product quality and reduced production costs.

Information detailing light coloured and black compound applications is available in over 40 Polysar Technical Reports. Tell us about your product development plans and we will send you appropriate literature and the name of the Polymer representative near you. Write to: Marketing Division, Polymer Corporation Limited, Sarnia, Canada.

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POLYSAR Krynacs

POLYMER CORPORATION LIMITED
SARNIA, CANADA

See overleaf for striking results of comparison tests under sun-lamp exposure.

Tests prove the definite superiority of improved Polysar Krynacs

Per Cent Yellowness of Oil Resistant Rubbers				
Rubber	Staining (Lacquer exposed)		Discolouration (Rubber exposed)	
	Absolute	Relative	Absolute	Relative
Original Polysar Krynac 800	**36.0**	**100**	**75.9**	**100**
Competitive nitrile rubber "A"	52.6	146	76.8	101
Competitive nitrile rubber "B"	52.2	145	83.8	110
Competitive nitrile rubber "C" most recently announced	**31.6**	**88**	**74.5**	**98**
IMPROVED KRYNAC SERIES	**19.2**	**53**	**68.2**	**90**

The yellowness figures in the above chart were determined by testing improved Polysar Krynacs along with original Polysar Krynac 800 and three competitive nitrile rubbers in a simple white compound.

$$\text{Relative Yellowness} = \frac{\text{Yellowness of Rubber}}{\text{Yellowness of Krynac 800}} \times 100$$

They show:

1. The superiority of the original Polysar Krynacs 800, 801, 802 and 803 over two standard competitive grades in discolouration and staining after sun-lamp exposure.

2. The striking improvement of the current Polysar Krynac series in discolouration and staining under sun-lamp exposure, not only over the original Polysar Krynac 800-3 series, but also over the most recently announced competitive nitrile rubber.

3. The reduction of yellowing of adjacent light coloured finishes to one-half of that experienced with the original Polysar Krynac series; to one-third of yellowing caused by standard competitive grades, or by almost one-third over the newest competitive grade.

Write our Marketing Division
for full information about the new Polysar Krynacs.

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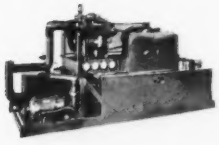

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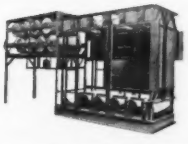

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for

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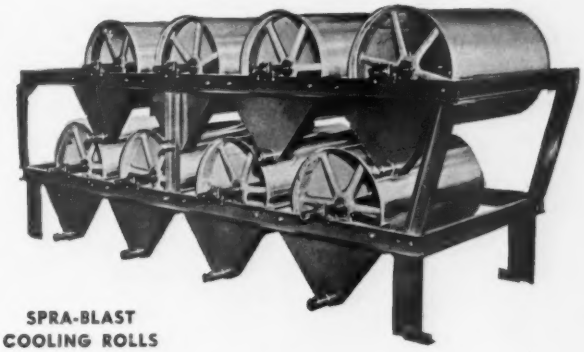
11,000 lbs. of calendered rubber per hr. from 150° to 80°
Production Speed 60 ft. per min.
Length of Roll Assembly—10 Ft.



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"SPRA-BLAST" Cooling Roll Assemblies are designed for maximum heat transfer efficiency in a minimum of space with uniform surface temperatures over entire width of roll.

Standard rolls are constructed of 16 gauge stainless steel shell equipped with patented Spra-Blast.

For close tolerance, high speed operations, rolls are available in any material and finish surface desired.

Rolls are provided both with and without drive, which can be synchronized to machine production and for constant tension on material at operating speeds.

Assemblies are engineered to meet specific plant requirements and availability of space.

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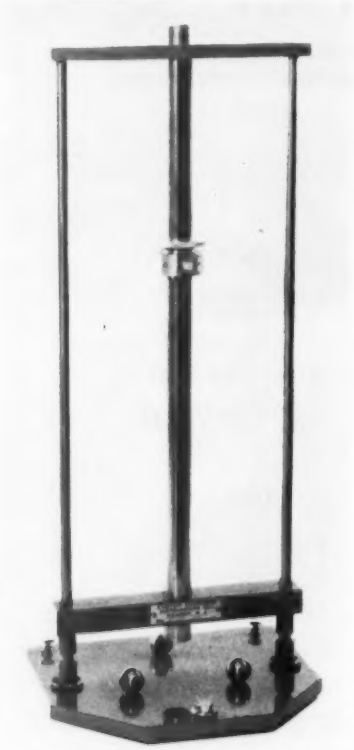
Custom Scientific Impact Tester

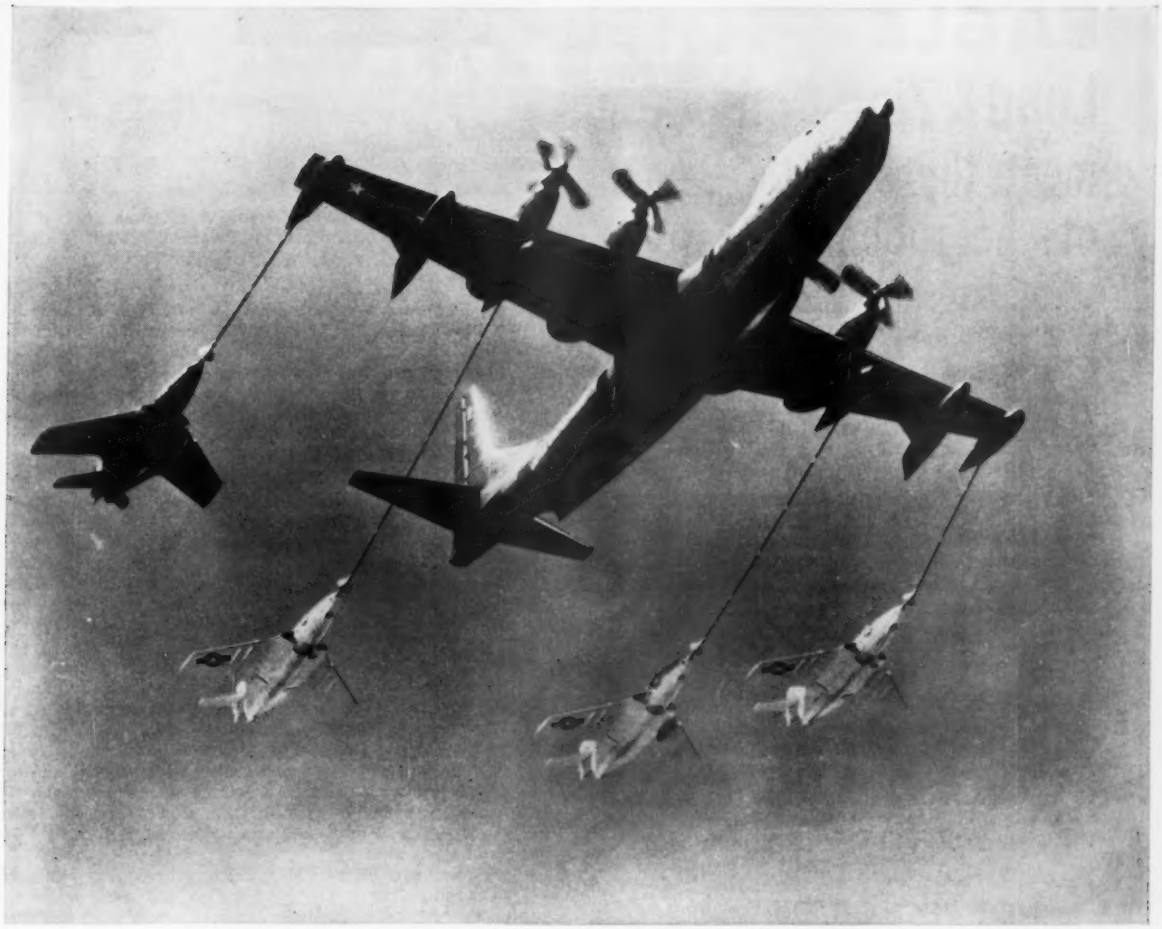
► Among the instruments manufactured by Custom Scientific Instruments, Inc., Kearny, N. J., is an impact tester which is designated Model CS-



103. The unit consists of a base, supports and a graduated tube with an adjustable drop lever to allow a free-falling weight to strike the center of a sample supported by three balls. This tester is described in Federal Specifications SS-7-306b.

Federal Products Mold Gage

► A simple mold gage, said to be very precise, for checking the accuracy of golf ball and other similar type molds, has been developed by Federal Products Corp., Providence, Rhode Island. The mold-half locates on a precision, 90 degree V-block and against a stop plate. It is rotated to check external diameter and over-all height, dial indicators showing variation from nominal with an accuracy of .0001-inch. The radius of the mold interior is checked by another indicator, which is also used to measure height of the dimple with reference to the area surrounding it. A master is furnished to permit rapid set-up and gage checking. All indicators have adjustable backs for coarse positioning and adjustable dials for fine adjustment.



Four Navy jet fighters take on fuel from a Convair R3Y-2 "Tradewind" in the first multiple refueling operation ever conducted from a seaplane. (UP Photo)

Making the refueling hose was a tricky problem, too!

"Dependable Taylor controls played an important part in processing in-flight refueling hose", says Hewitt-Robins, Stamford, Conn.

High speed, high altitude refueling of jet planes posed a tricky hose design problem. The hose required has to be resistant to jet-fuels; it has to withstand bending at extremely low temperatures; it has to absorb tremendous crush loads, yet coil easily on a small reel; it must not pull apart, even with buffeting end pulls in excess of 5,000 lbs.

Hewitt-Robins chemists and engineers licked all the problems and came up with a hose that met all the Air Force specifications.

Taylor instruments play an important role in the vulcanization of this hose by maintaining exact and constant curing temperatures. This insures optimum qualities in the cured rubber compounds.

When accuracy and dependability really count, remember that you can rely on Taylor controls . . . and on your experienced Taylor Field Engineer. Taylor Instrument Companies, Rochester, New York, or Toronto, Ontario.

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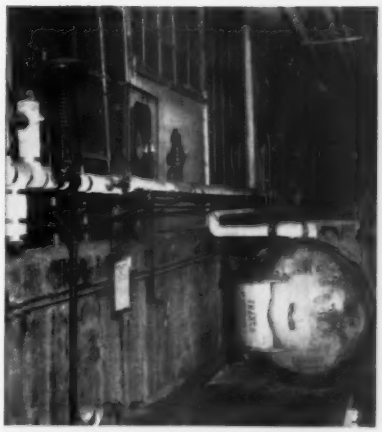

Curing Process Control, showing Taylor FULSCOPE Temperature Controller and HI-FLOW* Valve.*

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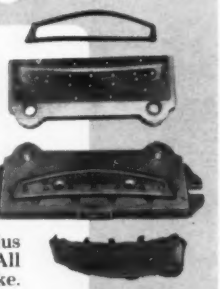

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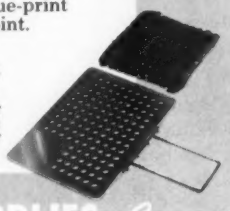

WESTERN SUPPLIES *Company*

2918 CASS AVE., SAINT LOUIS 6, MO.

Reviews

Gum Plastics (Rubber-Modified Plastics). By M. S. Thompson. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 5 x 7½ in. 194 pp. $4.50.

The subject of this book is gum (rubber-modified) plastic resins. The author gives a general introduction to the field of gum plastics, and follows with extended chapters on general properties of these products, basic chemistry and manufacture, processing and fabrication, and commercial applications. A subject index closes the book.

The book centers around impact-polystyrene polymers, ABS (acrylonitrile-butadiene-styrene) polymers, and impact-rigid polyvinyl chloride polymers, chosen because they are the more important commercial polymers. Extensive treatment has been given to their applications and to the reasons for their use. The chapters on general properties, chemistry, and fabrication techniques have been written so as to provide a more fundamental understanding of these compounds and how best to apply them.

In the past decade the class of materials combining plastics and rubbers has achieved great commercial significance. A summary glance of the extensive list of applications given by the author—they range from refrigerators to industrial pipe—makes one instantly aware of the import of these materials on the rubber industry. For this basic reason the volume is an important one, perhaps even more so for the people connected with rubber and with plastics in a non-technical capacity than for the scientist.

The book presents an excellent over-all survey of gum plastics, their history, production and uses. A reader can acquire an excellent general knowledge of the field by studying its contents, and also a basic understanding of the technology of these plastics. The author has done a scholarly job, and is to be commended for his competent survey of a widely diversified industry.

The book is ninth in a series offered by the publisher devoted to guidance and application of the increasing number of plastics materials. The present volume continues the high standards established by its predecessors.

•

Fringe Benefits. By Francis M. Wistert. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 5 x 7½ in. 156 pp. $3.75.

As is pointed out in the foreword to this book, using the term "fringe benefits" to describe payments other than wages to employees for their services is becoming more and more inapplicable. These payments have become so substantial that they are scarcely any longer on the "fringe," and for many, from presidents to janitors, constitute an important segment of the total compensation.

The author wisely attempts to do more than just gather information on the common forms of fringe benefits—he also presents the points of view of the interested parties, that is, employers, unions, employees and beneficiaries, and discusses the social and economic impact, or lack of impact, of the more important wage supplementation schemes.

Different chapters are used to present information on such subjects as general concepts, compulsory benefits, vacations and holidays, funded pension and retirement plans, group insurance, pay for time not worked, guaranteed annual wage, supplemental unemployment benefits, other fringe benefits and economic aspects of fringe benefits.

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Stabilite, a chemical of the diaryl ethylene diamine series, increases remarkably the effect of other commercial age resistors. In combination with diaryl amine antioxidants, Stabilite provides outstanding resistance to oxidation for all rubber compounds through a full range of temperatures. It imparts unusual flexing properties, minimum discoloration, and lowers cracking effects due to sunlight. Even in small quantities, Stabilite produces greater smoothness in calendering and tubing, gives unusually fine plasticity, lessens sunchecking and enhances flex resistance.

Unlike the diaryl amine antioxidants, Stabilite functions with them to extend their total effectiveness. Since it is completely different chemically, it causes a reaction which actually doubles the value of the diaryl amine antioxidants. In tests conducted in our laboratories, 0.5% Stabilite plus 0.5% common diaryl amines showed effectiveness greater than 1% of either used alone. Through the proper use of Stabilite, processors of rubber compounds can enjoy reduction in costs while definitely improving the antioxidant properties of their products. For a complete report on antioxidant tests using Stabilite and commercial diaryl amines write or call the C. P. Hall Company, Akron, Ohio.

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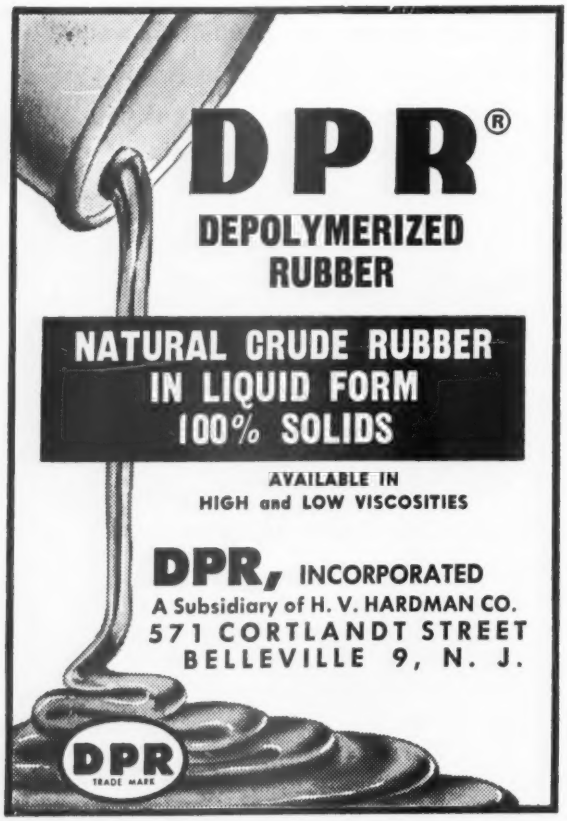


BOOKLETS, CATALOGS, etc.

Statistics as Applied in the Rubber Industry. Dyestuffs Division, Imperial Chemicals Industries Limited, P. O. Box 42, Hexagon House, Blackley, Manchester 9, England. 8¼ x 11 in. 36 pp.

This publication consists of the texts of six lectures delivered by members of the staff of the Dyestuffs Division of Imperial Industries Limited at Newton Heath Technical School, Manchester, England from November, 1957 to February, 1958. The titles of the six lectures are: "The Need for Statistical Experimentation," "Statistical Tests and Their Applications," "Design of Experiments," "Sources of Error in Rubber Compounding and Testing," "Application of Statistics in a Rubber Factory," and "Comparison of Variations Within and Between Laboratories." The quality of these papers is very high, and, especially in consideration of their uncommon subject matter, they will be read with profit by many involved in rubber technology. A word of warning: the authors have dealt with their subjects in depth and have produced highly technical papers which must be studied rather than merely read.

•

Introduction to G.B. Data Sheets. Chemicals Division, Golden Bear Oil Co., 325 West 8th St., Los Angeles 14, Calif. 8½ x 11 in. 8 pp.

This booklet has been issued in a looseleaf folder with 19 of the data sheets it introduces. It explains the purpose of the sheets, and the kind of information they give. The four series of materials described in detail on the sheets, all of which are used as plasticizers, extenders, lubricants or reclaiming agents for rubber, are briefly presented, and product properties (general considerations, meaning of the data, physical characteristics and chemical composition) are discussed. Each of the 19 sheets accompanying the booklet is devoted to an individual material. The tradenames used to designate the four series of materials are Califlux, Bearflux, Cyclolube and Petroflux.

•

Pigment Dispersion with Aliphatic Organic Chemicals. Armour Chemical Division, 1355 West 31st St., Chicago 9, Ill. 8½ x 11 in. 16 pp.

This booklet contains sections on pigment dispersion in paints, plastics and rubber. The latter reports on a recently completed study to determine the effects of various cationic chemicals in improving the dispersion of pigments in rubber. Data are given for both natural and styrene rubber. Tables are used to present the results on physical properties, power savings during compounding, and related subjects, and graphs portray the story as regard to modulus, tensile strength and tear resistance.

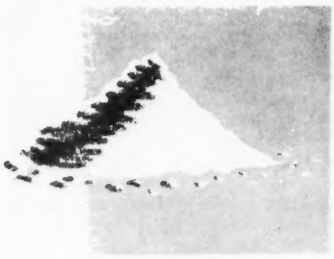
•

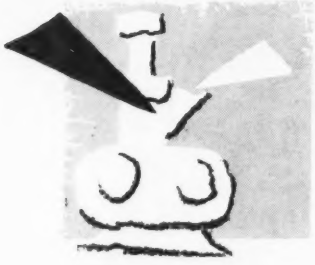
1959 Guide to Dow Corning Silicones. Dow Corning Corp., Midland, Mich. 8½ x 11 in. 16 pp.

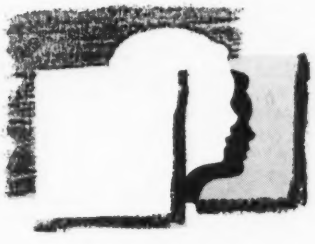
This booklet gives information on a variety of silicone products, many of direct interest to the rubber industry: for example, additives for polyurethane foams, release agents for rubber, Silastic RTV (a room temperature vulcanizing rubbery product used as a sealant and for other applications), and Silastic silicone rubber. An extensive presentation is made of the latter, with data on physical properties, electrical properties, heat aging, solvent resistance and special characteristics which make it suitable for specific applications. An excellent use is made of photographs in telling the story.

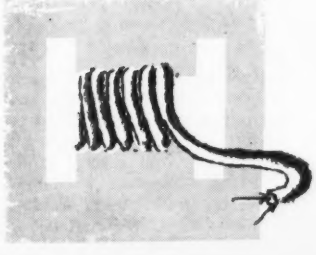
KENRICH

INTRODUCES POWDERED KENFLEX® RESINS









The Kenrich Corp., has announced the development of Kenflex® Resins in powdered form. The resin is combined with 5% Micro-Cel E to prevent caking and represents a physical state long sought by rubber and wire companies.

Kenflex® Resins are a series of polymers of aromatic hydrocarbons. They are non-volatile, non-migratory and are soluble in plasticizers and common solvents except water and the lower alcohols.

AUTOMATION—Kenflex® in powdered form permits greater accuracy in proportioning formulas and insures that what you weigh out gets into the batch without waste or loss or without hand-scraping, thus lending itself to automation in compounding. The 5% Micro-Cel E prevents caking under normal factory conditions and permits free flow of bin-stored material in the automatic compounding cycle.

GOOD PROCESSING—Kenflex® Resins in all forms are highly efficient plasticizers. They are high in wetting power and this aids dispersion of ingredients. They increase plasticity and provide smooth processing, good mold flow and excellent surface finish.

HIGH ELECTRICALS—Kenflex® Resins impart high electricals to finished stocks and also improve moisture resistance. This makes them especially useful in wire and cable compounds based on rubber, neoprene and plastics.

IMPROVES HEAT AGING—In neoprene compounds, Kenflex® Resins provide substantial improvement in heat aging and, by reducing scorch, they help to step up production and reduce factory scrap.

Kenflex® Resins are available in a number of grades for all types of compounding, and in a variety of physical forms to suit any given condition.

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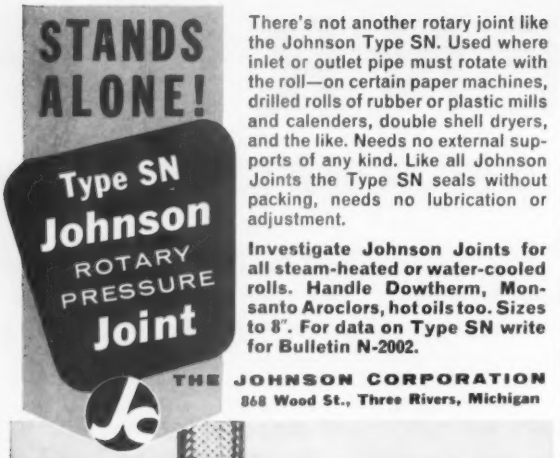

There's not another rotary joint like the Johnson Type SN. Used where inlet or outlet pipe must rotate with the roll—on certain paper machines, drilled rolls of rubber or plastic mills and calenders, double shell dryers, and the like. Needs no external supports of any kind. Like all Johnson Joints the Type SN seals without packing, needs no lubrication or adjustment.

Investigate Johnson Joints for all steam-heated or water-cooled rolls. Handle Dowtherm, Monsanto Aroclors, hot oils too. Sizes to 8". For data on Type SN write for Bulletin N-2002.

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REVIEWS (CONT'D)

Stanford Web Guide Equipment. Stanford Engineering Co., Salem, Ill. 8½ x 11 in. 6 pp.

The Stanford line of machinery for automatic web guiding operations is described in this brochure. Three units are featured: Model PH-55 hydraulic web guide, Model 110 vacuum principle web guide, and Model 1 vacuum web guide. Advantages which suit them for unwind, rewind or intermediate guiding operations are detailed. Additional components and their uses are also described. One page of the bulletin is devoted to the requirements of machines used for each of the three operations noted above, and the last page to schematic diagrams of industrial installations. Photographs are used to advantage in telling the story.

•

The Story of C.I.C. High Pressure Moulded Footwear. C.I.C. Machinery, Inc., 610 Atlantic Ave., Boston, Mass. 8½ x 11 in. 20 pp.

A general discussion of several molding methods of making shoes and specific information on the Cema process for producing molded footwear are given in this bulletin. Types of machines generally used (internal pressure, low pressure and high pressure), molds, manufacturing procedures and other subjects are discussed. The operation of the Cema machine, which is designed to eliminate many steps in the molding stage, is described in detail, with advantages listed. A summary discusses two subjects: economies in rubber compounding and the future outlook. A list of definitions of terms closes the booklet.

•

Polyurethane Foam Catalysts. (Bulletin No. B6-R3). Armour Chemical Division, 1355 West 31st St., Chicago 9, Ill. 9 x 11½ in. 10 pp.

This technical bulletin deals with the use of high weight tertiary amines as catalysts for the manufacture of polyurethane foams. The booklet opens with an analysis of the chemical reaction involved, and continues with formulas for polyester and polyether urethane foams employing Armour catalysts of two types, alkyl dimethyl amines and N-alkyl morpholine. Data on the physical properties are given. Closing sections are devoted to toxicity, handling, availability and technical services of the company.

•

Day Ribbon Blenders. (Bulletin 800-159). J. H. Day Co., Cincinnati 12, Ohio. 8½ x 11 in. 8 pp.

Construction features and dimensional and mechanical specifications of blenders and large capacity mixers for powders, pastes and liquids, and mixers for corrosive materials are given in this publication. Also described are different types of agitators and several kinds of pre-sifting and final sifting equipment available for mounting on the blender or mixer tank. Tables are used to portray the extensive data on sizes and capacities, and photographs illustrate the machines.

•

Helecon Luminescent Pigment Color Selector. United States Radium Corp., Morristown, N. J. 8½ x 11 in. 4 pp.

This folder describes the use of fluorescent and phosphorescent pigments in rubber, plastics and other materials. The brochure lists some 15 different fluorescent pigments for a variety of applications in a wide spread of color ranges and brightness levels. Each is accompanied by a brief section of technical data comprising laboratory and field test information. Known and potential applications appear with each listing.

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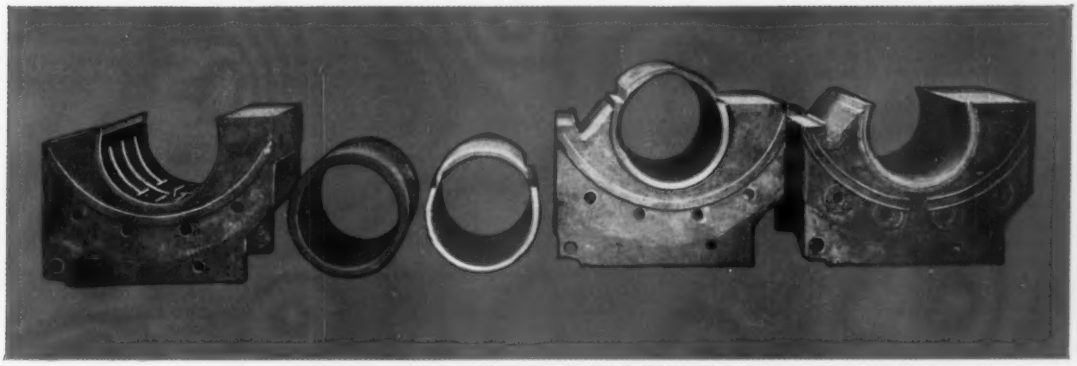

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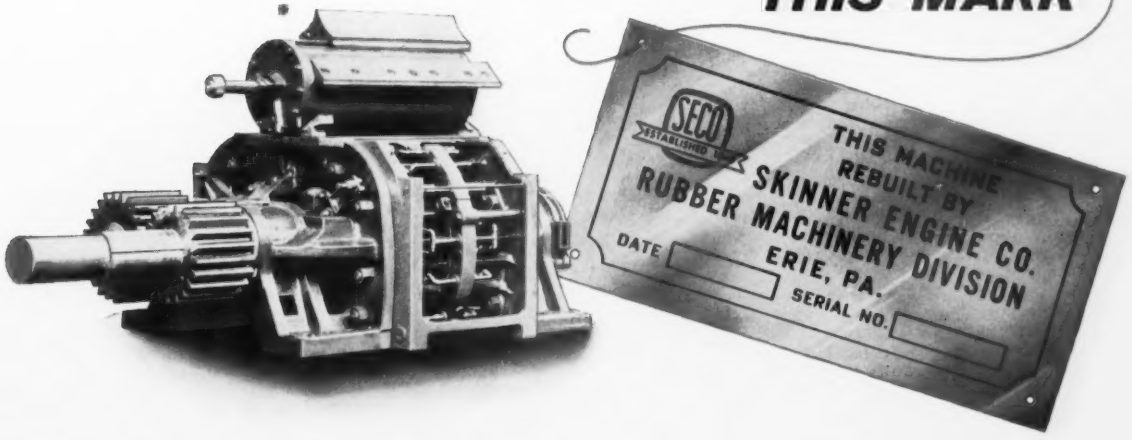

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (April 1), the price of natural rubber on the New York Commodity Exchange has moved in a range of 275 points, high for the period being 35.00c reached on the 29th and the 30th of April, and low being 32.25c reached on April 1. The average price of spot rubber for the month of April was 33.72c based on 22 trading days. This compares with an average of 31.62c in March.

According to reports from London, the British are viewing the rise in the price of natural rubber with some concern. The fact that prices continue to rise without any evidence of Russian buying in recent months calls attention to how unstable the market would become should Russia start buying on the scale of last year.

Natural rubber, contrary to several recent years, is now in a strong statistical position. Indications are that demand is going to increase while supplies remain stable. It is difficult to predict the course of natural rubber prices, but if the Russians enter the market in any significant way, natural rubber prices will likely rise. Another factor bearing upon the price situation are the increases in automobile production in the United States, Canada and on the continent.

In commenting upon the price situation, the *Financial Times* of London points out that the next few months hold very real dangers for the natural rubber industry. "The more the gap between natural and synthetic prices widens, the greater the incentive for consumers to change over to the man-made product.

"The two types of rubber are in many ways complementary, but they are also competitive, and it could be this latter aspect which will become more pronounced. The U. K. synthetic rubber producers who started operations last year have not found it easy to win customers away from the traditional synthetic suppliers in North America.

"Already they are going ahead with a campaign emphasizing synthetic rubber stability and relative cheapness and nothing would suit their case better than a sharp upswing in natural rubber," says the *Financial World*.

Shortages Loom

Accelerated demand from all over the world plus reduced Indonesian output are laying the groundwork for what will possibly be the largest natural rubber deficit in years. It is expected that Indonesian production will amount to about 675,000 long tons in 1959. Estimated 1958 production was in the order of 705,000 long tons while in the previous year 735,000 long tons of natural rubber were produced.

NEW YORK, MAY 1, 1959

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM APRIL 1 TO APRIL 30

Apr.	Spot	May	July	Sept.	Sales
1	32.25	32.30	32.20	32.20	109
2	32.50	32.75	32.52	32.50	48
3	32.38	32.55	32.35	32.30	35
4	....	....	....	....	..
5	....	....	....	....	..
6	32.38	32.60	32.38	32.35	21
7	32.75	33.00	32.75	32.60	25
8	33.00	33.30	32.90	32.70	57
9	33.63	34.00	33.45	33.05	170
10	33.63	34.00	33.60	33.10	64
11	....	....	....	....	..
12	....	....	....	....	..
13	33.88	34.50	33.90	33.55	65
14	34.25	34.70	34.40	33.75	119
15	33.63	33.80	33.65	33.15	129
16	34.13	34.35	34.10	33.45	140
17	34.13	34.60	34.25	33.60	93
18	....	....	....	....	..
19	....	....	....	....	..
20	33.88	34.05	33.90	33.35	79
21	33.88	34.05	34.00	33.50	80
22	34.25	34.50	34.40	34.00	57
23	34.13	34.25	34.25	33.95	88
24	34.13	34.40	34.55	34.25	61
25	....	....	....	....	..
26	....	....	....	....	..
27	34.13	34.05	34.25	34.15	99
28	34.88	34.60	35.05	34.95	164
29	35.00	35.00	35.05	34.90	138
30	35.00	35.00	35.20	35.10	62

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.35
May	.35
June	.35
Thin Latex Crepe:	
Spot	.35½
Thin Brown Crepe, No. 2	.33¼
Flat Bark Crepe	.29

London Market
(Standard Smoked Sheets)

July-Sept.	34.02 — 34.32
Oct.-Dec.	34.02 — 34.17

Singapore Market
(Standard Smoked Sheets)

June	33.03 — 33.20

Middling Upland Quotations

	Close Mar. 31	High	Low	Close
		April 30		
May	35.81	35.90	35.87	35.90
July	35.11	35.19	35.05	35.10
Oct.	32.79	32.80	32.75	32.77

Notes & Quotes

According to B. R. Wendrow, technical manager of the U.S. Rubber Reclaiming Co., the reclaim industry's future position will depend only on its ability to come up with the necessary ingenuity in technology and sales promotion to keep pace with associated industry. The past is evidence that the industry can not only maintain its present status but improve its future position.

Synthetic Rubber

Writing in the April, 1959, issue of *Natural Rubber News*, H. C. Bugbee, president of the Natural Rubber Bureau points out that now that the European Common Market has been in existence for three months, it becomes clear that American exports of synthetic rubber must be watched with c reful attention.

Mr. Bugbee is of the opinion that almost certainly the demand for exports not only of rubber manufactured products, but even of American synthetic rubber exports will be affected as plants are constructed in Europe and European local supplies become more abundant.

To date, he states, synthetic rubber exports have not reflected any real drop in European demand. Several new synthetic rubber facilities will go on stream late in 1959 and in 1960. However, continued increases in over-all demand should keep synthetic rubber exports up in the first part of 1959.

Total U.S. exports of synthetic rubber in 1958 amounted to 193,179 tons compared with 203,468 tons in 1957. Exports of synthetic rubber in January and February, 1959, were actually up a small amount compared with the same two months of the previous year — 35,241 tons against 33,263 tons. Nevertheless the "handwriting is on the wall," Mr. Bugbee believes, because of steadily increasing production of European synthetic.

Soviet Industry

According to the March, 1959, issue of *Rubber Trends*, London, the Soviet Union currently has the capacity to produce 460,000 metric tons of rubber a year. Plans call for the production of some 1.5 million metric tons by 1965.

Rubber Trends points out that Russia has experienced a good deal of difficulty with her synthetic rubber program, partly because of her dependence upon natural alcohol as a raw material. This has added materially to the expense of synthetic rubber production in the Soviet Union.

The dependence upon natural alcohol is also said to account for the inferior quality of the Russian synthetic rubber. The tire industry is reported to be using mixtures of 45 to 55 per cent second quality natural rubber with synthetic rubber.

Rubber Trends notes that Russian plans call for far-reaching changes in the types of raw materials to be used in the industry. Natural alcohol is to be abandoned in favor of synthetic alcohol. The investment and production costs of synthetic rubber plants using synthetic alcohol are said to be 50 per cent lower than those using natural alcohol.

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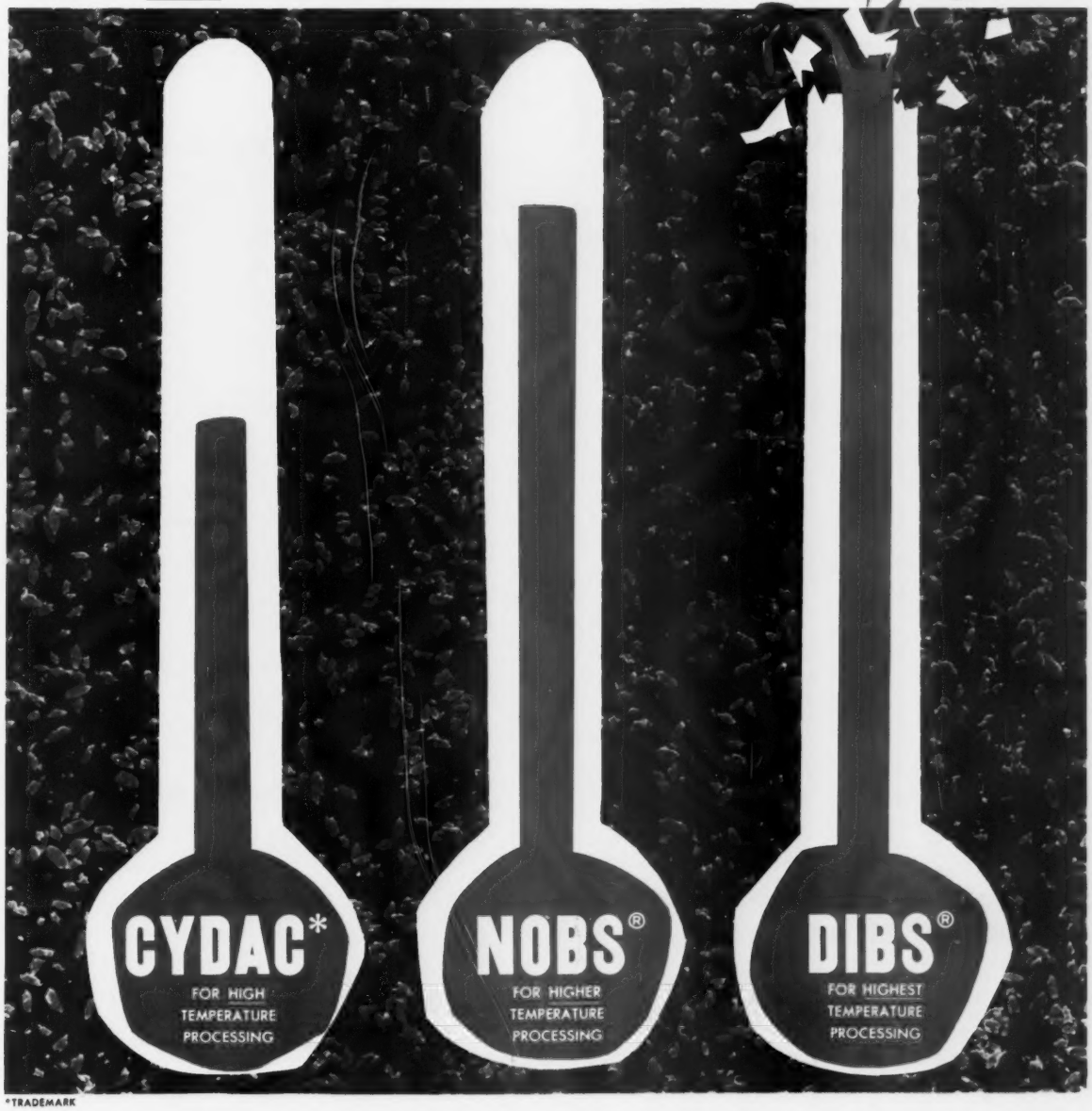

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Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900 [1]
Butaprene NH	.6500 [1]
Butaprene NL	.5000 [1]
Butaprene NXM	.5800 [1]
Chemigum N1NS	.6400 [2]
Chemigum N3NS	.5800 [2]
Chemigum N5	.5800 [2]
Chemigum N6	.5000 [2]
Chemigum N6B	.5000 [2]
Chemigum N7	.5000 [2]
Chemigum N8	.5000 [2]
Chemigum N600	.5000 [2]
Herecol N-33	.6800 [2]
Hycar 1001	.5800 [2]
Hycar 1002	.5000 [2]
Hycar 1014	.6000 [2]
Hycar 1041	.5800 [2]
Hycar 1042 and 1043	.5000 [2]
Hycar 1051	.5800 [2]
Hycar 1052	.5000 [2]
Hycar 1053	.5000 [2]
Hycar 1072	.6400 [2]
Hycar 1203	.4600 [2]
Hycar 1312	.5000 [2]
Hycar 1411	.6200 [2]
Hycar 1432	.5900 [2]
Hycar 1441	.6200 [2]
Paracril AJ	.4850 [2]
Paracril ALT	.5000 [2]
Paracril B and BJ	.5000 [2]
Paracril BLT and BJLT	.5000 [2]
Paracril C and CLT	.5800 [2]
Paracril CV	.5900 [2]
Paracril D	.6500 [2]
Paracril 18-80	.6000 [2]
Paracril OZO	.4600 [2]
Polysar Krynac 800	.5000 [2]
Polysar Krynac 801	.5800 [2]
Polysar Krynac 802	.5000 [2]
Polysar Krynac 803	.5000 [2]

Butadiene-Styrene Types

Ameripol 1000	.2410 [2]
Ameripol 1001	.2410 [2]
Ameripol 1002	.2435 [2]
Ameripol 1006	.2410 [2]
Ameripol 1006 (crumb)	.2475 [2]
Ameripol 1007	.2410 [2]
Ameripol 1009	.2475 [2]
Ameripol 1009 (crumb)	.2590 [2]
Ameripol 1011	.2475 [2]
Ameripol 1012	.2425 [2]
Ameripol 1012 (crumb)	.2490 [2]
Ameripol 1013	.2500 [2]
Ameripol 1013 (crumb)	.2615 [2]
Ameripol 1500	.2410 [2]
Ameripol 1501	.2410 [2]
Ameripol 1502	.2410 [2]
Ameripol 1703	.2060 [2]
Ameripol 1705	.2035 [2]
Ameripol 1707	.1910 [2]
Ameripol 1708	.1910 [2]
Ameripol 1710	.1885 [2]
Ameripol 1712	.1885 [2]
Ameripol 4600	.2410 [2]
Ameripol 4650	.1820 [2]
Ameripol 4651	.1770 [2]
Ameripol 4652	.1425 [2]
Ameripol 4654	.1870 [2]
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Ameripol 4751	.1400 [2]
Ameripol 4752	.1600 [2]
Ameripol 4753	.1480 [2]
ASRC 1000	.2410 [2]
ASRC 1001	.2410 [2]
ASRC 1004	.2410 [2]
ASRC 1006	.2410 [2]
ASRC 1009	.2475 [2]
ASRC 1018	.2700 [2]
ASRC 1019	.2650 [2]
ASRC 1500	.2410 [2]
ASRC 1502	.2410 [2]
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ASRC 1703	.2060 [2]
ASRC 1708	.1910 [2]
ASRC 3110	.2600 [2]
Baytown 1600	.1930 [2]
Baytown 1601	.1930 [2]
Baytown 1602	.1930 [2]
Baytown 1801	.1760 [2]
Baytown 1803	.1740 [2]
C-102 (Shell)	.2300 [2]
Carbomix 3750	.1820 [2]
Carbomix 3751	.1545 [2]
Carbomix 3752	.1845 [2]
Carbomix 3753	.1640 [2]
Carbomix 3754	.1770 [2]
Carbomix 3755	.1470 [2]
CB-102 (Shell)	.1850 [2]
Copo 1500	.2410 [2]
Copo 1502	.2410 [2]
Copo 1505	.2610 [2]
Copo 1712	.1885 [2]
Copo 1773	.2060 [2]
Copo 1778	.1910 [2]
Copo 2109	.3000 [2]
Copo 3900	.2310 [2]
FR-S 123	.1960 [2]
FR-S 127	.2600 [2]
FR-S 141	.2800 [2]
FR-S 146	.2410 [2]
FR-S 154	.1885 [2]
FR-S 155	.1885 [2]
FR-S 158	.3000 [2]
FR-S 173	.2060 [2]
FR-S 178	.1910 [2]
FR-S 179	.2410 [2]
FR-S 181	.2410 [2]
FR-S 1000	.2410 [2]
FR-S 1001	.2410 [2]
FR-S 1004	.2410 [2]
FR-S 1006	.2410 [2]
FR-S 1007	.2410 [2]
FR-S 1009	.2475 [2]
FR-S 1010	.2600 [2]
FR-S 1012	.2425 [2]
FR-S 1013	.2500 [2]
FR-S 1014	.2810 [2]
FR-S 1500	.2410 [2]
FR-S 1502	.2410 [2]
FR-S 1703	.2060 [2]
FR-S 1710	.1885 [2]
FR-S 1712	.1885 [2]
Naugapol 1016	.2650 [2]
Naugapol 1018	.2700 [2]
Naugapol 1019	.2650 [2]
Naugapol 1021	.3000 [2]
Naugapol 1022	.2800 [2]
Naugapol 1023	.2850 [2]
Naugapol 1503	.2625 [2]
Naugapol 1504	.2950 [2]
OB-102 (Shell)	.1825 [2]
OB-104 (Shell)	.1475 [2]
OB-106 (Shell)	.1510 [2]
OB-110 (Shell)	.1410 [2]
OB-111 (Shell)	.1540 [2]
OB-113 (Shell)	.1750 [2]
Philprene 1000	.2410 [1]
Philprene 1001	.2410 [1]
Philprene 1006	.2410 [1]
Philprene 1009	.2475 [1]
Philprene 1010	.2600 [1]
Philprene 1018	.2700 [1]
Philprene 1019	.2650 [1]
Philprene 1100	.1940 [1]
Philprene 1104	.1900 [1]
Philprene 1500	.2410 [1]
Philprene 1502	.2410 [1]
Philprene 1503	.2625 [1]
Philprene 1600	.1930 [1]
Philprene 1601	.1930 [1]
Philprene 1605	.1900 [1]
Philprene 1703	.2060 [1]
Philprene 1706	.2030 [1]
Philprene 1708	.1910 [1]
Philprene 1712	.1885 [1]
Philprene 1803	.1740 [1]
Plioflex 1006	.2410 [2]
Plioflex 1500C	.2410 [2]
Plioflex 1502	.2410 [2]
Plioflex 1507	.2410 [2]
Plioflex 1703	.2060 [2]
Plioflex 1710C	.1885 [2]
Plioflex 1712C	.1885 [2]
Plioflex 1713	.1750 [2]
Plioflex 1714C	.1725 [2]
Plioflex 1773	.2060 [2]
Plioflex 1778	.1910 [2]
Polysar Kryflex 200	.2510 [2]
Polysar Krylene	.2410 [2]
Polysar Krylene NS	.2410 [2]
Polysar Krynol 651	.1885 [2]
Polysar Krynol 652	.1910 [2]
Polysar S	.2410 [2]
Polysar S-50	.2410 [2]
Polysar S-X 371	.2550 [2]
Polysar SS-250	.2875 [2]
S-1000	.2300 [2]
S-1002	.2325 [2]
S-1006	.2300 [2]
S-1009	.2400 [2]
S-1011	.2325 [2]
S-1013	.2300 [2]
S-1100	.1850 [2]
S-1500	.2300 [2]
S-1502	.2300 [2]
S-1600	.1825 [2]
S-1602	.1825 [2]
S-1605	.1800 [2]
S-1703	.1950 [2]
S-1707	.1800 [2]
S-1709	.1775 [2]
S-1712	.1775 [2]
S-1803	.1650 [2]
S-1804	.1750 [2]
S-7701	.1850 [2]
SP-103 (Shell)	.2900 [2]
Synpol 1000	.2410 [1]
Synpol 1001	.2410 [1]
Synpol 1002	.2435 [1]
Synpol 1006	.2410 [1]
Synpol 1007	.2410 [1]
Synpol 1009	.2475 [1]
Synpol 1012	.2425 [1]
Synpol 1061	.2410 [1]
Synpol 1500	.2410 [1]
Synpol 1502	.2410 [1]
Synpol 1551	.2410 [1]
Synpol 1703	.2060 [1]
Synpol 1707	.1910 [1]
Synpol 1708	.1910 [1]
Synpol 1711	.1900 [1]
Synpol 1712	.1885 [1]
Synpol 8000	.2410 [1]
Synpol 8150	.1930 [1]
Synpol 8200	.1910 [1]
Synpol 8201	.1750 [1]
Synpol 8250	.1740 [1]
Synpol 8253	.1584 [1]
Synpol 8254	.1545 [1]
Synpol X 274	.2550 [1]

Butyl Rubbers

Enjay Butyl 035 and 150	.2300 [2]
Enjay Butyl 165 NS	.2400 [2]
Enjay Butyl 215	.2300 [2]
Enjay Butyl 217	.2300 [2]
Enjay Butyl 218	.2300 [2]
Enjay Butyl 268 NS	.2400 [2]
Enjay Butyl 325	.2300 [2]
Enjay Butyl 365 NS	.2400 [2]
Polysar Butyl 100	.2450 [2]
Polysar Butyl 101	.2775 [2]
Polysar Butyl 200 and 300	.2450 [2]
Polysar Butyl 301	.2550 [2]
Polysar Butyl 400	.2450 [2]

Chlorosulfonated Polyethylene

Hypalon 20	.7000 [2]
Hypalon 30	.7000 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type AD	.5500 [2]
Neoprene Type FB	.6500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [2]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WB	.4100 [2]
Neoprene Type WHV	.3900 [2]
Neoprene Type WRT	.4500 [2]
Neoprene Type WX	.4160 [2]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000 [2]
Thiokol Type FA	.6900 [2]
Thiokol Type ST	1.2500 [2]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 [2]
GE Silicone Gum (not compounded)	4.00 [2]
Silastic (compounded)	1.90 [2]
Silastic (gums)	3.85 [2]
Union Carbide (gums)	4.00 [2]
Union Carbide (compounds)	2.50 [2]

POLYMERS

Latex

(per pound carload)

Butadiene-Styrene Types

Butaprene N-300	.4600 [1]
Butaprene N-400	.5400 [1]
Butaprene N-401	.5400 [1]
Chemigum 200	.4900 [3]
Chemigum 235	.5400 [3]
Chemigum 236	.5400 [3]
Chemigum 245	.4600 [3]
Chemigum 246	.4600 [3]
Chemigum 247	.4600 [3]
Chemigum 248	.4600 [3]
CL-101 (Shell)	.2800 [2]
Hycar 1512	.4600 [3]
Hycar 1551	.5400 [3]
Hycar 1552	.4600 [3]
Hycar 1561	.5400 [2]
Hycar 1562	.4600 [3]
Hycar 1571	.5400 [3]
Hycar 1572	.5100 [2]
Hycar 1577	.4600 [2]
Hycar 1852	.4600 [3]
Nitrex 2612	.4600 [1]
Nitrex 2614	.4600 [1]
Nitrex 2614-A	.4600 [1]
Nitrex 2515	.5100 [1]
Nitrex 2615-A	.5100 [1]
Nitrex 2616	.5400 [1]
Nitrex 2617	.4600 [1]
Nitrex 2617-A	.4600 [1]
Nitrex 2619	.5300 [1]
Nitrex 2620	.4600 [1]
Nitrex 2625	.4600 [1]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3375 [3]
Copo 2110	.3200 [3]
Copo X-800	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000	.2775 [1]
Naugatex 2001	.2775 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105	.3200 [1]
Naugatex 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Pliolite 2000	.2775 [3]
Pliolite 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000	.2600 [2]
S-2006	.2600 [2]
S-2101	.2600 [2]
S-2105	.2800 [2]
S-2108	.2900 [2]

Neoprene

Neoprene Latex 60	.4000 [2]
Neoprene Latex 571	.3700 [2]
Neoprene Latex 572	.3900 [2]
Neoprene Latex 601-A	.4000 [2]
Neoprene Latex 673	.5000 [2]
Neoprene Latex 735	.3800 [2]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3700 [2]
Neoprene Latex 950	.4700 [2]

Polysulfide Rubbers

Thiokol Type MX	.8000 [2]
Thiokol Type WD-2	1.2500 [2]
Thiokol Type WD-6	.8000 [2]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

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SPECIAL PAPERS FOR SPECIAL PURPOSES

MARKETS

(continued)

Reclaimed Rubber

The Rubber Manufacturers Association reports that in the first three months of this year a total of 80,030 long tons of reclaimed rubber were produced in the United States against the 61,187 long tons produced in the previous year. The first quarter of this year has seen the consumption of 77,073 long tons of reclaimed rubber. In the first quarter of 1958, 58,738 long tons of reclaim were consumed.

The accelerated production and consumption of reclaimed rubber in the first quarter of the current year are indicative of increased activity in the automobile industry. Some automobile manufacturers have revised their estimates of 1959 production upward and in some cases look to a 7 million passenger car year.

At any rate, the reclaimed rubber industry should enjoy a relatively high production-consumption year in 1959, close to 1955 levels. It will be remembered that in that year something more than 312,000 long tons of reclaimed rubber were consumed in the United States.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

In the first three months of this year, a total of 73,198 long tons of scrap rubber were consumed in the United States. Consumption of scrap rubber in March topped 26,000 long tons. Indications are that 1959 will see the consumption of close to 300,000 long tons of scrap rubber, some in the trade believe.

At the moment, the market for scrap rubber is rather quiet. Many industry members attended the 46th Annual Meeting of the National Association of Waste Material Dealers held on April 6 in Chicago. Sidney Freedman (Muehlstein), president of the Scrap Rubber and Plastics Institute, acted as chairman of the scrap meeting.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.04¼
No. 1 peelings	ton	30.00
No. 2 peelings	ton	25.00
No. 3 peelings	ton	21.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07¼
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.05¼

Tire Fabrics

The National Aniline Division of Allied Chemical Corp., New York, N. Y., has announced that its new kind of nylon tire yarn, "Golden Caprolan," is now in full commercial production at its chemical fiber plant near Hopewell, Va. According to the company, this is the first full commercial production of a nylon tire yarn based upon caprolactam monomer and climaxes ten years of intensive research and development. Golden Caprolan is a polymer based on epsilon aminocaproic acid with a molecular construction almost identical to that of nylon 6,6.

High Heat Stability

Allied states that a new high level of heat stability is an original contribution to nylon tire yarns incorporated into Golden Caprolan by its researchers. Not only was this goal attained, but the company also established a new high standard of heat stability for nylon tire yarns.

Golden Caprolan is also said to possess an exceptionally high level of resistance to flex fatigue, contributing importantly to the sidewall life of tires in which the new yarn is used, the company claims.

Moisture resistance is another quality of Golden Caprolan which is important in a tire yarn, since water entering the tire body through cuts and bruises has little effect on cord strength.

Over the past several years, major tire manufacturers have been subjecting the new yarn to rigid laboratory testing and road evaluations, including grueling road tests in the Southwest, and numerous trials on trucks, buses and taxi-cabs. Allied reports that Golden Caprolan now is being used in volume by all major tire producers and a number of small companies, being made into casings for passenger cars, trucks, buses and off-the-road equipment.

The company's fiber plant in Hopewell has a rated capacity in excess of 20 million pounds, and is operated in conjunction with a 60 million pound caprolactam monomer plant and a fiber application laboratory.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.73
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.96
840	lb.	1.61

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9	oz. (per square yard)	lb.	.71
9.25	oz. (per square yard)	lb.	.69
11.65	oz. (per square yard)	lb.	.63
14.4	oz. (per square yard)	lb.	.72

Liquid Latex

Natural: A total of 20,597 log tons of natural rubber latex were imported into the United States in the first three months of this year according to the Rubber Manufacturers Association. This amount was almost exactly the same as in the first three months of the preceding year.

Consumption of natural rubber latex in the first quarter of this year amounted to 20,533 long tons, about 3,500 long tons more than in the first quarter of 1958. As of March 31, 1959, there were 9,200 long tons of natural latex on hand, a total equal to about one and one-half month's consumption.

Natural rubber latex has now reached a 41-42c per pound level at East Coast ports in car load lots. There have been some expressions of concern that prices have risen to a point at which some buyer resistance may be encountered.

Historically, 40c latex has found buyer opposition. With demand for natural latex up, however, price resistance may not be strong at this point. If prices continue to rise, there may be a change in sentiment.

Synthetic: The first few months of 1959 have indicated that about 10,000 long tons of S-type latex are being produced each month indicating a yearly production of well over 100,000 long tons. Consumption has been proceeding at about a 9,000 long ton a month level.

If production-consumption remain at current levels for the balance of the year, 1959 will indeed be a banner year for the synthetic latex market. Production and consumption of N-type and neoprene latex have also been proceeding at a pace ahead of 1958.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in a range of only 20 points since our last report (April 1), high for the period being 36.10c reached on April 27, 28, 29 and 30, and low being 35.90c reached on April 7, 14 and 15. The average price of middling uplands for the month of April was 36.05c based on 22 trading days. This compares with an average of 35.71c in the previous month.

Some cotton men have an idea that in order to check further accumulations of cotton, some plan should be devised to freeze the government surplus and sell it at a rate of 10 per cent a year for 10 years. At the end of that time, all acreage controls and subsidies would be eliminated and farmers would be compensated if cotton sells below a certain level.

No payment would be made, however, if the price of cotton gave that product a "fair share" of the national income as conceived by relating cotton prices to wages and prices received for other commodities and services. No Congressional action or comment has as yet been evidenced on the proposal.

RUBBER TRENDS

by The Economist Intelligence Unit, Ltd.

RUBBER TRENDS is a quarterly bulletin for all those concerned with rubber, whether as a manufacturer, dealer or producer. The bulletin provides regular analysis of the main factors affecting the supply and consumption of both natural and synthetic rubber. **It does not duplicate information already available elsewhere; the emphasis throughout is on long term studies of rubber trends.**

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STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1958	474,409	484,492	20,085	76,491
1958:				
Feb.	52,546	36,711	903	110,880
Mar.	41,986	38,191	1,150	112,863
Apr.	31,511	36,608	1,395	107,897
May	29,237	36,014	1,707	100,985
June	28,279	37,607	1,634	91,779
July	27,521	34,235	3,107	85,577
Aug.	39,057	39,444	1,369	85,666
Sept.	38,321	44,814	1,019	82,622
Oct.	40,267	48,957	1,550	77,859
Nov.	42,484	43,877	3,140	75,335
Dec.	57,067	46,600	2,000	75,325
1959:				
Jan.	54,950	49,913	1,438	82,487

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1958	406,059	153,127,066	67,593	45,047,040	473,652
1958:					
Apr.	28,582	14,476,348	6,348	4,148,636	34,930
May	27,941	13,520,935	4,121	2,760,020	32,062
June	23,596	11,000,264	4,323	2,741,928	27,919
July	22,665	10,305,428	3,158	2,002,980	25,823
Aug.	33,917	15,957,912	5,140	3,097,894	39,057
Sept.	36,309	16,945,200	5,034	3,247,978	41,343
Oct.	38,142	18,121,031	6,994	4,676,358	45,136
Nov.	37,345	19,262,061	4,074	3,236,086	41,419
Dec.	46,542	25,407,908	7,951	5,400,581	54,493

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1947	646,362	277,951	89,000	38,128	34,928	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1958	663,644	614,561	100,196	.....	.....	476,599	1,855,000
1958:							
July	60,376	66,099	8,263	6,090	1,745	32,427	175,000
Aug.	58,807	62,413	8,925	5,425	1,869	32,561	170,000
Sept.	57,355	57,659	8,021	8,116	2,201	34,148	167,500
Oct.	58,743	63,440	7,204	9,310	1,727	34,576	175,000
Nov.	51,692	63,439	9,215	11,834	500	30,820	167,500
Dec.	71,695	67,233	11,267	.....	500	39,305	190,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1958	1,357,404	238,439	83,804	904,000	628,853	3,212,500
1958:						
July	98,100	17,410	6,816	69,000	53,674	245,000
Aug.	111,206	11,763	5,454	60,250	53,827	242,500
Sept.	123,275	22,596	8,140	77,500	65,989	297,500
Oct.	136,972	19,020	8,014	78,750	62,244	305,000
Nov.	122,114	19,401	8,249	76,250	53,986	280,000
Dec.	132,391	22,733	8,064	31,500	107,812	302,500

Source: International Rubber Study Group. * Estimated.

Rim Production

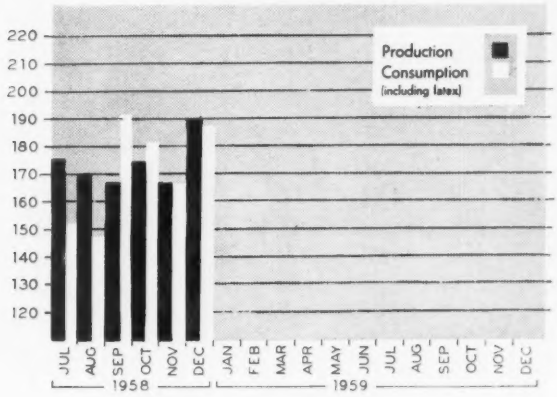
	1954	1955	1956	1957	1958
Passenger Car	25,952,322	38,092,080	27,109,610	27,301,567	20,665,688
Truck & Bus	4,463,689	6,642,329	6,315,428	5,468,223	3,887,910
Agricultural	1,279,040	1,931,768	1,416,938	1,368,127	1,218,240
Earth Mover	21,536	38,849	88,812	67,289	61,883
Total	31,734,587	46,705,036	34,930,788	34,205,206	25,833,721

	1958 Oct.	1958 Nov.	1958 Dec.	1959 Jan.	1959 Feb.	1959 Mar.
Passenger Car	1,921,856	2,101,264	2,779,148	2,497,831	2,265,105	2,700,787
Truck & Bus	350,833	408,232	456,754	395,926	448,899	589,507
Agricultural	100,293	87,715	212,999	91,379	101,912	148,987
Earth Mover	2,925	3,680	8,705	8,140	6,222	13,893
Total	2,375,907	2,600,891	3,457,606	2,993,276	2,822,138	3,453,174

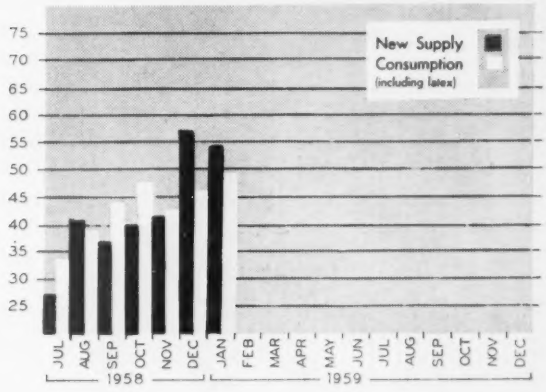
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

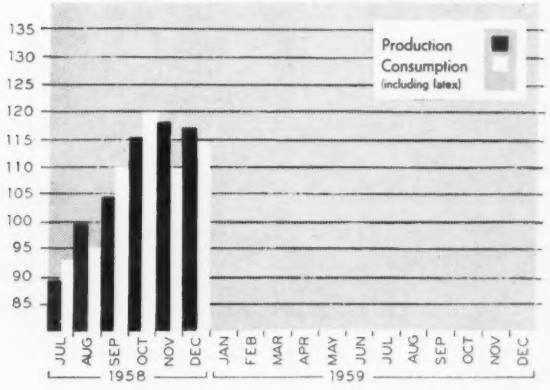
NATURAL RUBBER—WORLD
(thousands of long tons)



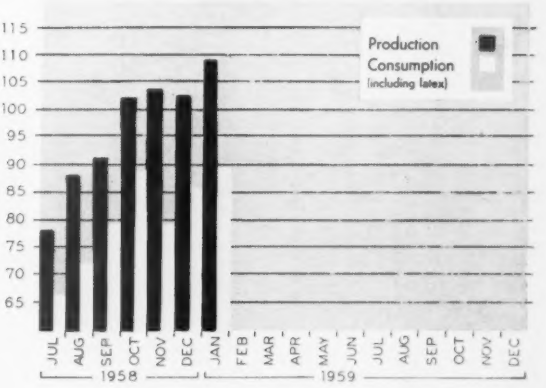
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



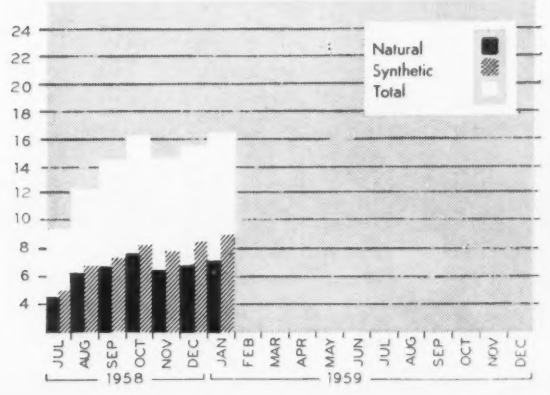
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



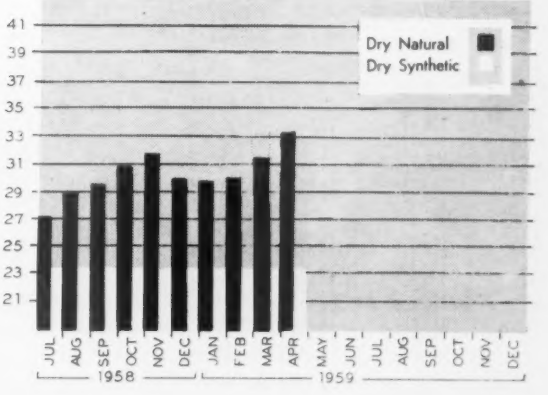
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	310,579	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1954	490,405	69,150	58,802	21,396	639,753
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1957	913,321	110,721	67,418	33,618	1,125,078
1958	872,565	97,806	54,113	32,431	1,056,915
1958:					
May	63,046	7,450	4,512	2,369	77,377
June	63,230	7,251	2,080	2,327	74,888
July	65,570	6,248	3,907	2,221	77,946
Aug.	74,051	6,745	4,725	2,824	88,345
Sept.	75,764	8,586	4,363	3,185	91,898
Oct.	83,691	9,283	5,527	3,652	102,063
Nov.	85,044	10,394	4,384	3,642	103,464
Dec.	86,219	9,201	4,174	3,263	102,857
1959:					
Jan.	90,622	9,991	5,305	3,304	109,222

Consumption

1950	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1954	500,345	57,203	61,464	17,715	636,727
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1957	767,218	75,461	55,413	25,187	923,279
1958	730,196	69,694	53,432	26,590	880,912
1958:					
May	55,797	4,990	4,258	1,823	66,868
June	58,860	5,027	4,402	2,105	70,394
July	54,241	4,623	3,791	1,765	64,420
Aug.	59,825	5,935	4,277	2,364	72,401
Sept.	65,256	6,647	4,725	2,538	79,166
Oct.	73,699	7,378	4,982	2,759	88,818
Nov.	66,294	6,448	4,419	2,562	79,723
Dec.	71,731	6,955	4,897	2,606	86,189
1959:					
Jan.	74,222	7,198	5,359	2,857	89,636

Exports

1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1957	157,977	30,242	8,748	6,377	203,344
1958	142,069	31,337	13,793	6,718	193,917
1958:					
Mar.	15,647	3,424	757	410	20,238
Apr.	11,583	2,356	949	698	15,586
May	14,067	2,899	1,218	784	18,968
June	11,993	1,562	1,022	473	15,050
July	10,602	2,403	1,051	674	14,730
Aug.	8,521	2,603	972	558	12,654
Sept.	8,802	2,774	812	518	12,906
Oct.	12,292	2,547	1,407	553	16,799
Nov.	11,872	3,010	1,306	639	28,527
Dec.	12,634	2,484	1,258	520	16,896

Stocks

1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1954	115,499	11,349	19,767	4,280	150,395
1955	108,989	12,220	10,500	6,030	137,739
1956	151,763	14,077	28,744	7,934	202,518
1957	140,199	18,843	31,489	7,454	197,985
1958	143,533	15,688	18,770	7,292	185,283
1958:					
Apr.	143,981	18,764	30,012	6,469	199,226
May	137,277	19,014	29,246	6,392	191,929
June	132,800	18,763	25,954	6,231	183,721
July	132,303	18,242	24,882	6,097	181,524
Aug.	136,735	16,344	24,618	6,224	183,921
Sept.	138,987	15,154	22,554	6,145	182,840
Oct.	134,613	15,474	22,091	6,356	178,534
Nov.	140,673	15,373	20,192	7,273	183,511
Dec.	143,533	15,688	18,770	7,292	185,283

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	. . .	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1958	67,591	65,669	10,679	11,560	87,908	155,499
1958:						
Mar.	7,147	4,880	759	787	6,426	13,573
Apr.	6,348	3,889	907	830	5,626	11,974
May	4,121	3,635	808	882	5,325	9,446
June	4,323	4,539	696	890	6,125	10,448
July	3,158	3,645	677	893	5,215	8,373
Aug.	5,140	5,474	892	1,103	7,469	12,609
Sept.	5,034	6,165	1,075	1,173	8,413	13,447
Oct.	6,994	7,617	1,170	1,308	10,095	17,089
Nov.	4,074	7,307	1,156	1,205	9,668	13,742
Dec.	7,950	6,891	986	1,033	8,910	16,860
1959:						
Jan.	8,574	7,801	1,049	1,104	9,954	18,528

Consumption[1]

1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,369	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	75,009	68,305	9,039	8,630	85,974	160,983
1958	70,183	60,283	9,555	10,549	80,387	150,570
1958:						
Mar.	5,501	4,708	672	703	6,083	11,584
Apr.	4,796	4,093	750	779	5,622	10,418
May	4,951	4,102	833	777	5,712	10,663
June	5,248	4,165	678	898	5,741	10,989
July	4,483	3,433	667	687	4,787	9,270
Aug.	6,030	4,654	811	1,001	6,466	12,496
Sept.	6,677	5,779	870	993	7,642	14,319
Oct.	7,643	6,534	1,039	1,094	8,667	16,310
Nov.	6,470	6,009	847	1,082	7,938	14,408
Dec.	6,748	6,893	854	1,081	8,828	15,576
1959:						
Jan.	7,184	6,886	925	1,244	9,055	16,239

Stocks at End of Period

1945	3,121	....	....	....	....	3,121
1946	4,865	..	....	....	....	4,865
1947	5,033	. ..	..	....	....	5,033
1948	11,235	....	....	. ..	....	11,235
1949	5,063	....	..	...	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12,064	7,451	1,384	1,558	10,393	22,457
1957	14,454	8,347	1,267	1,974	11,588	26,042
1958	8,900	7,672	1,663	2,519	11,854	20,754
1958:						
Mar.	16,825	7,991	1,281	1,974	11,246	28,071
Apr.	17,415	7,756	1,398	1,744	10,898	28,313
May	17,604	7,240	1,292	1,732	10,264	27,868
June	17,078	7,337	1,267	1,888	10,492	27,570
July	15,516	6,693	1,312	1,990	9,995	25,511
Aug.	13,750	7,166	1,195	2,049	10,410	24,160
Sept.	12,482	6,842	1,354	2,096	10,616	23,098
Oct.	10,324	7,129	1,365	2,229	10,376	20,700
Nov.	8,795	7,810	1,498	2,530	11,838	20,633
Dec.	8,900	7,672	1,663	2,519	11,854	20,754
1959:						
Jan.	10,025	7,822	1,551	2,418	11,791	21,816

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

TIRE FABRIC PROCESSING EQUIPMENT

"ROLLEVATORS"®

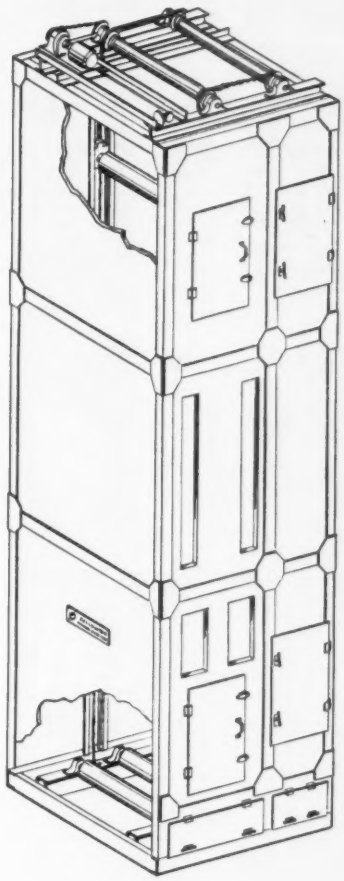
LOW OPERATING COST
SIMPLE, AUTOMATIC OPERATION

CONSTANT TEMPERATURE, CONSTANT EXPOSURE & CONSTANT TENSION OR STRETCH AT VARIABLE LINE SPEEDS

PARTICULARLY ADAPTED TO TIRE CORD PROCESSING SYSTEMS

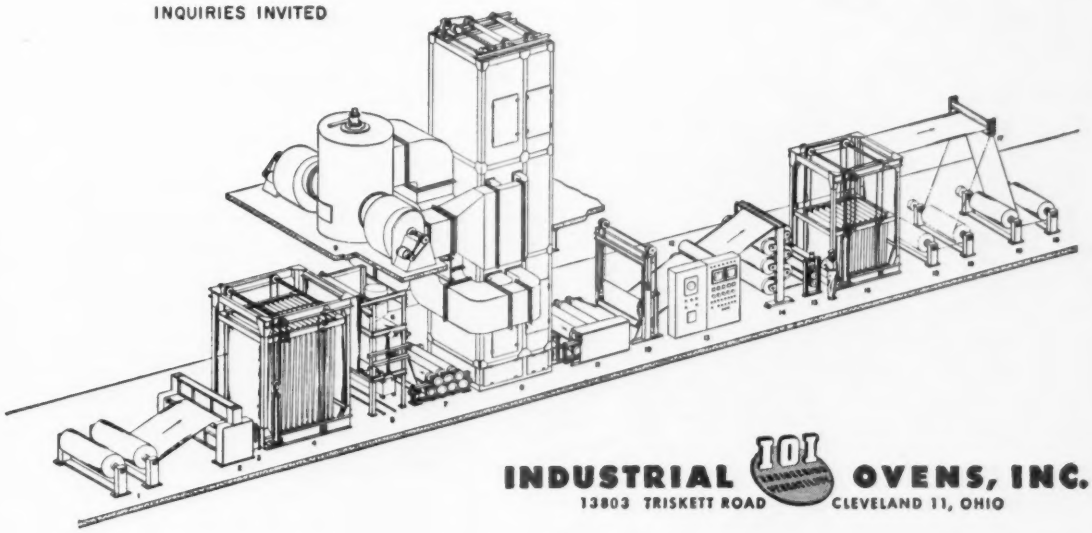
NO QUICK COOLING REQUIRED
NO WASTE OR DEGRADATION OF MATERIAL

"ROLLEVATORS"® WITH TENSIONS UP TO 30,000# NOW IN USE



THE PREFERENCE FOR OUR "ROLLEVATOR"® UNITS BY LEADING RUBBER COMPANIES IS PROOF OF THEIR SUPERIOR QUALITIES.

INQUIRIES INVITED



INDUSTRIAL 101 OVENS, INC.
13803 TRISKETT ROAD CLEVELAND 11, OHIO

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	35,422	62,146	1,757	99,325	100,406	79,872
Passenger Car	30,873	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1957 (total)	36,765	65,150	1,733	103,649	106,940	250,536
Passenger Car	32,725	56,603	889	90,217	93,542	210,146
Truck and Bus	4,053	8,546	846	13,432	13,398	40,384
1958 (total)	26,783	70,797	1,348	98,928	96,563	20,939
Passenger Car	23,408	61,570	717	85,696	83,636	17,778
Truck and Bus	3,375	9,226	631	13,232	12,927	3,161
1958:						
Mar. (total)	2,114	5,334	95	7,543	7,573	23,446
Passenger Car	1,845	4,726	49	6,621	6,569	19,786
Truck and Bus	269	608	46	923	1,004	3,659
Apr. (total)	1,876	6,183	116	8,175	7,477	22,658
Passenger Car	1,594	5,517	61	7,173	6,522	19,051
Truck and Bus	282	666	55	1,002	955	3,607
May (total)	2,173	6,220	110	8,503	7,653	21,834
Passenger Car	1,874	5,593	56	7,523	6,715	18,263
Truck and Bus	299	626	54	980	938	3,571
June (total)	1,932	7,182	117	9,231	8,293	20,920
Passenger Car	1,667	6,387	63	8,117	7,306	17,465
Truck and Bus	265	794	54	1,113	988	3,456
July (total)	2,020	7,442	111	9,573	7,288	18,615
Passenger Car	1,756	6,502	60	8,318	6,368	15,501
Truck and Bus	265	940	51	1,255	920	3,114
Aug. (total)	1,055	6,679	115	7,848	7,762	18,521
Passenger Car	847	5,807	57	6,711	6,753	15,535
Truck and Bus	208	871	57	1,137	1,009	2,986
Sept. (total)	1,442	6,365	105	7,912	8,277	18,925
Passenger Car	1,170	5,425	64	6,659	7,134	16,045
Truck and Bus	273	940	41	1,253	1,143	2,880
Oct. (total)	1,838	6,476	140	8,454	9,344	19,913
Passenger Car	1,522	5,369	81	6,972	7,983	17,134
Truck and Bus	316	1,106	59	1,482	1,361	2,779
Nov. (total)	3,369	4,320	100	7,788	8,393	20,403
Passenger Car	3,056	3,651	58	6,765	7,182	17,420
Truck and Bus	313	669	42	1,023	1,211	2,983
Dec. (total)	4,057	4,711	124	8,892	9,376	20,939
Passenger Car	3,701	3,977	61	7,739	8,046	17,778
Truck and Bus	356	734	63	1,153	1,330	3,161
1959:						
Jan. (total)	2,960	6,742	104	9,806	10,184	21,399
Passenger Car	2,631	6,028	57	8,716	8,859	17,998
Truck and Bus	329	714	47	1,090	1,325	3,401
Feb. (total)	2,805	5,611	135	8,551	10,270	23,019
Passenger Car	2,442	4,932	60	7,434	8,962	19,435
Truck and Bus	364	679	74	1,117	1,308	3,584

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,526
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1948	3,909,270	1,363,856	5,132,090	1958	4,257,812	874,278	5,132,090
1958:							
Jan.	478,416	79,790	558,206	July	316,408	65,047	381,455
Feb.	396,221	71,024	467,245	Aug.	194,974	55,221	250,195
Mar.	359,464	73,658	433,122	Sept.	102,687	46,353	149,040
Apr.	322,482	73,886	396,368	Oct.	272,241	69,934	342,175
May	352,076	75,291	427,367	Nov.	511,885	93,282	605,167
June	342,228	70,652	412,880	Dec.	608,730	100,140	708,870
1959:							
Jan.	539,451	96,044	635,495	July	.....	.....	.....
Feb.	476,977	99,973	576,950	Aug.	.....	.....	.....
Mar.	.....	.....	.....	Sept.	.....	.....	.....
Apr.	.....	.....	.....	Oct.	.....	.....	.....
May	.....	.....	.....	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	...
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1956	3,100	32,358	1,040	36,498	34,405	6,109
1957	3,046	35,687	1,076	39,806	39,774	80,077
1958	2,678	37,872	870	41,420	41,266	8,602
1958:						
May	225	2,742	68	3,035	3,530	8,189
June	202	3,332	67	3,602	3,476	8,156
July	215	3,174	76	3,466	2,890	7,680
Aug.	160	3,097	74	3,331	3,305	7,664
Sept.	207	3,228	63	3,498	3,390	7,657
Oct.	244	3,238	84	3,567	3,768	7,869
Nov.	264	2,575	60	2,899	3,319	8,372
Dec.	288	3,029	94	3,411	3,491	8,602
1959:						
Jan.	287	4,450	63	4,800	3,806	7,536
Feb.	311	3,924	81	4,316	4,094	7,364

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50,637	41,665	113,396	748,370
1958	72,404	67,594	214,701	63,050	113,583	28,913	68,307	52,904	117,752	801,208
1958:										
Mar.	6,530	4,248	15,340	3,863	9,215	2,322	3,760	3,941	9,036	58,255
Apr.	5,424	4,643	15,705	3,881	9,079	2,056	5,287	4,087	9,696	59,858
May	5,534	5,331	15,958	4,769	10,347	2,518	5,519	3,675	9,149	64,800
June	5,986	5,716	16,205	5,462	9,117	2,518	4,020	3,932	9,399	62,355
July	4,796	5,330	15,520	4,883	8,093	2,526	3,860	4,381	4,362	53,751
Aug.	6,594	5,547	19,286	6,245	10,530	2,810	6,002	9,194	9,497	75,705
Sept.	6,696	6,971	20,029	6,194	10,340	2,370	7,236	4,308	11,349	75,493
Oct.	7,358	6,975	23,989	7,116	11,555	2,528	8,580	4,859	13,560	86,520
Nov.	5,760	6,431	20,239	6,024	9,938	2,134	7,227	4,015	10,439	72,207
Dec.	5,954	7,871	22,162	6,110	9,843	1,996	9,376	3,815	11,292	78,419
1959:										
Jan.	5,959	8,050	23,818	5,139	11,708	2,442	5,988	3,533	12,648	79,285
Feb.	5,590	9,094	22,638	5,052	11,176	2,325	7,312	4,139	12,601	79,927

Source: Chemical Division, U. S. Tariff Commission.

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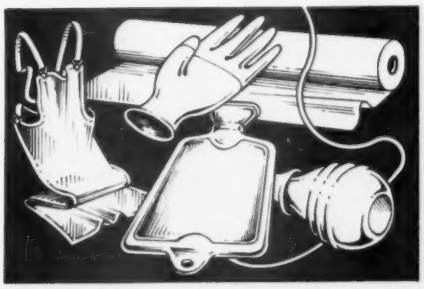

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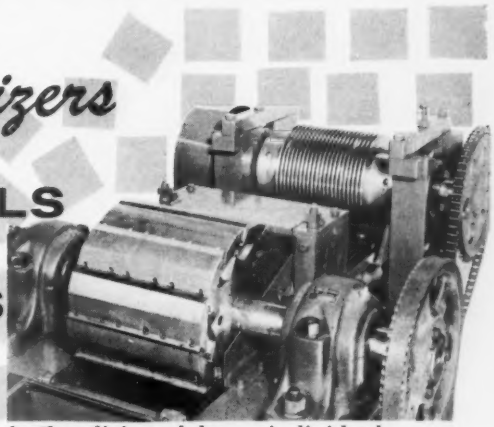

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1957 Production Workers (thousands)	1957 Average Weekly Earnings	1957 Average Weekly Hours	1957 Average Hourly Earnings	1958 Production Workers (thousands)	1958 Average Weekly Earnings	1958 Average Weekly Hours	1958 Average Hourly Earnings
Jan.	216.0	$91.21	40.9	$2.23	200.9	$87.48	38.2	$2.29
Feb.	212.6	90.80	40.9	2.22	191.3	85.04	37.3	2.28
Mar.	211.4	89.28	40.4	2.21	184.0	87.02	38.0	2.29
Apr.	191.3	87.60	40.0	2.19	176.0	85.88	37.5	2.29
May	204.2	88.80	40.0	2.22	172.3	87.86	38.2	2.30
June	196.8	91.21	40.9	2.23	175.8	91.10	39.1	2.33
July	199.8	94.16	41.3	2.28	175.1	91.89	39.1	2.35
Aug.	204.3	92.84	40.9	2.27	181.2	96.80	40.5	2.39
Sept.	206.4	92.97	40.6	2.29	187.5	97.51	40.8	2.39
Oct.	209.5	93.03	40.1	2.32	194.5	97.27	40.7	2.39
Nov.	209.0	93.20	40.0	2.33	195.3	98.09	40.7	2.41
Dec.	207.3	92.40	40.0	2.31	198.2	102.66	41.9	2.45
Tires and Tubes								
Jan.	87.4	107.64	41.4	2.60	81.6	98.52	36.9	2.67
Feb.	86.8	106.19	41.0	2.59	78.5	93.02	35.1	2.65
Mar.	86.9	102.40	40.0	2.56	76.0	98.05	37.0	2.65
Apr.	71.1	103.46	40.1	2.58	72.1	95.67	36.1	2.65
May	84.9	103.46	40.1	2.58	70.4	99.48	37.4	2.66
June	78.2	107.23	41.4	2.59	71.2	103.63	38.1	2.72
July	83.9	112.20	42.5	2.64	71.0	106.59	38.9	2.74
Aug.	84.2	107.83	41.0	2.63	72.5	113.96	40.7	2.80
Sept.	84.4	107.20	40.3	2.66	74.1	113.40	40.5	2.80
Oct.	84.4	105.18	39.1	2.69	75.3	113.24	40.3	2.81
Nov.	84.0	106.62	39.2	2.72	76.2	115.75	40.9	2.83
Dec.	83.6	105.84	39.2	2.70	77.1	121.40	42.2	2.87
Rubber Footwear								
Jan.	18.3	71.76	39.0	1.84	17.5	74.87	39.2	1.91
Feb.	17.8	72.10	39.4	1.83	17.0	74.68	39.1	1.91
Mar.	17.8	72.68	39.5	1.84	16.7	76.61	39.9	1.92
Apr.	17.5	70.64	38.6	1.83	16.5	75.46	39.3	1.92
May	17.3	71.92	39.3	1.83	16.3	75.85	39.3	1.93
June	17.4	72.29	39.5	1.83	16.3	77.20	40.0	1.93
July	16.8	72.13	39.2	1.84	15.9	75.25	39.4	1.91
Aug.	17.2	73.05	39.7	1.84	16.4	77.18	40.2	1.92
Sept.	17.6	74.45	39.6	1.88	16.8	76.62	39.7	1.93
Oct.	17.7	76.02	39.8	1.91	17.1	77.01	39.9	1.93
Nov.	18.0	78.96	40.7	1.94	17.2	77.22	39.6	1.95
Dec.	17.9	79.35	40.9	1.94	17.1	78.01	39.8	1.96
All Other Rubber Products								
Jan.	110.3	81.39	40.9	1.99	101.8	80.94	39.1	2.07
Feb.	108.0	81.18	41.0	1.98	95.8	80.32	38.8	2.07
Mar.	106.7	81.19	40.8	1.99	91.3	79.87	38.4	2.08
Apr.	102.7	79.60	40.2	1.98	87.4	79.87	38.4	2.08
May	102.0	79.80	40.1	1.99	85.6	80.29	38.6	2.08
June	101.2	81.81	40.7	2.01	88.3	83.77	39.7	2.11
July	99.1	82.62	40.7	2.03	88.2	82.92	39.3	2.11
Aug.	102.9	83.84	41.1	2.04	92.3	86.24	40.3	2.14
Sept.	104.4	85.08	41.1	2.07	96.6	89.21	41.3	2.16
Oct.	107.4	86.10	41.0	2.10	102.1	88.78	41.1	2.16
Nov.	107.0	85.05	40.5	2.10	101.9	88.54	40.8	2.17
Dec.	105.8	84.03	40.4	2.08	104.0	92.60	41.9	2.21

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1952	1953	1954	1955	1956	1957	1958	1959
Jan.	42.96	33.24	34.16	35.07	35.24	34.82	36.31	35.67
Feb.	41.64	33.76	35.00	35.04	36.26	34.82	35.83	35.69
Mar.	41.70	34.10	35.23	34.33	36.70	35.35	36.05	35.71
Apr.	41.79	33.85	35.22	34.23	36.43	35.43	36.00	36.05
May	39.98	34.30	35.34	34.80	36.65	35.40	36.27	....
June	41.31	34.11	35.17	34.83	36.67	35.45	36.33	....
July	40.37	34.20	35.37	34.61	35.43	35.49	36.51	....
Aug.	40.42	33.82	35.19	34.53	34.31	35.15	36.36	....
Sept.	39.75	33.69	35.46	33.85	34.35	34.74	36.00	....
Oct.	37.52	33.53	35.24	33.93	34.45	35.09	36.23	....
Nov.	35.59	33.60	34.80	34.87	34.56	36.06	36.24	....
Dec.	33.76	33.52	35.03	34.95	34.56	36.50	35.75	....
Average for Year	39.71	33.81	35.10	34.59	35.50	35.36	36.16	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1956	1957	1958		1956	1957	1958
Jan.	147	145	116	July	125	136	125
Feb.	140	141	114	Aug.	135	141	132
Mar.	135	145	116	Sept.	132	138	136
Apr.	136	132	112	Oct.	134	135	133
May	127	134	113	Nov.	126	131	141
June	120	135	125	Dec.	137	117	140

Sales by the Rubber Industry

(in Millions of Dollars*)

	1956	1957	1958		1956	1957	1958
Jan.	415	496	448	July	459	514	478
Feb.	445	495	413	Aug.	436	514	438
Mar.	451	476	396	Sept.	429	481	464
Apr.	445	490	429	Oct.	454	490	493
May	464	481	428	Nov.	463	431	472
June	450	458	445	Dec.	461	427	518

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1956	1957	1958		1956	1957	1958
Jan.	935	1,047	1,100	July	987	1,045	980
Feb.	970	1,036	1,087	Aug.	1,007	1,074	1,024
Mar.	979	1,030	1,069	Sept.	1,007	1,074	1,024
Apr.	970	1,031	1,047	Oct.	1,002	1,097	1,022
May	985	1,024	1,020	Nov.	1,024	1,101	1,018
June	975	1,027	986	Dec.	998	1,092	994

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1917	90	52	72.23	1938	17⅞	10¼	14.64
1918	70	40	60.15	1939	24	14⅜	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22 40
1921	21¼	11½	16.36	1942	22½	22½	22 50
1922	28⅜	13⅝	17.50	1943	22½	22½	22 50
1923	37⅛	24¼	29.45	1944	22½	22½	22 50
1924	40⅛	17⅝	26.20	1945	22½	22½	22 50
1925	121	34⅜	72.46	1946	22½	22½	22 50
1926	88½	36¼	48.50	1947	25	14	20 00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29 15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24 21
1933	9⅞	2⅞	5.96	1954	34¼	19½	23 61
1934	15⅞	8¾	12.92	1955	52	29⅜	39 16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37¾	26⅝	31.13
1937	26⅞	14	19.39	1958	32⅝	24⅝	28.13

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1952	1953	1954	1955	1956	1957	1958	1959
Jan.	....	29.40	20.22	33.92	41.70	33.32	27.15	30.34
Feb.	....	27.57	19.98	34.90	33.68	30.43	26.32	30.26
Mar.	....	26.59	20.16	31.08	33.68	31.76	26.65	31.62
Apr.	....	24.66	22.06	31.75	31.74	32.23	26.44	33.72
May	....	25.52	21.96	31.35	29.61	32.12	25.51	....
June	....	24.42	23.01	34.74	30.54	32.80	26.20	....
July	30.52	23.64	24.12	40.84	33.91	32.88	27.70	....
Aug.	29.36	23.36	23.26	45.85	35.69	32.13	28.72	....
Sept.	27.42	23.06	23.99	48.27	32.64	29.94	29.49	....
Oct.	27.26	20.82	26.57	43.81	32.68	29.24	31.06	....
Nov.	29.25	20.58	28.07	44.95	35.18	27.47	32.10	....
Dec.	31.26	20.92	29.88	48.40	37.01	29.25	30.28	....
Average for Year	29.15	24.21	23.61	39.16	34.24	31.13	28.13	....

Note: (a) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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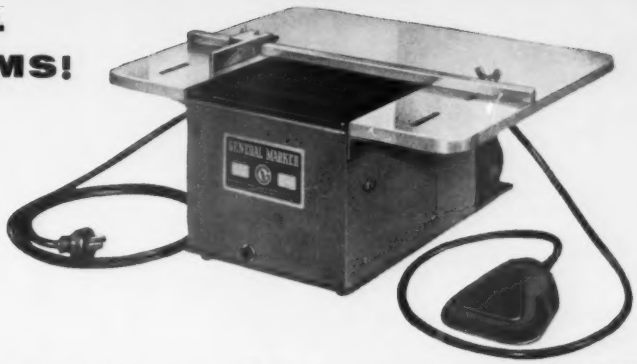

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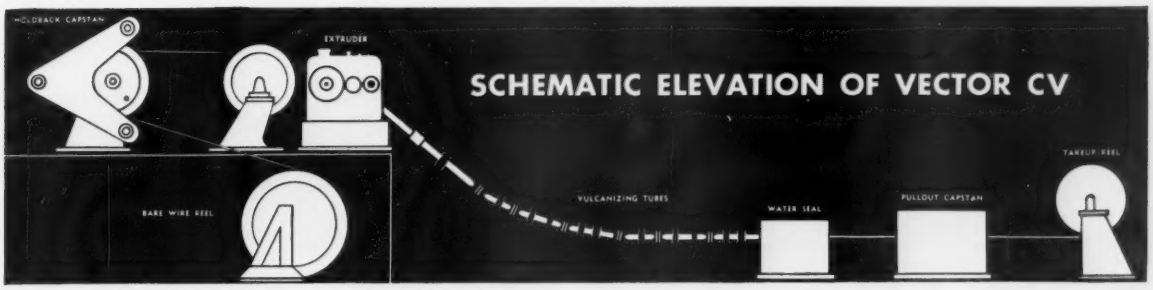

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Various Compounding Materials Consumed by the Rubber Industry

Material	1951	1952	1953	1954	1955	1956	1957
Antimony, Primary							
Short tons	19c	66c	20c	49c	78	156	284
% of total	.001	.004	.001	.004	.006	.010	.024
Asphalt: [a]							
Short tons	21,414	33,288	.....	.....	.. ..	.....	.....
% of total	0.3	0.4	.....	.....	.....	.....	.....
Barite (Barytes):							
Short tons	15,000	18,000	21,000	20,000	25,104	22,101	21,782
% of total	2.13	2.0	2.0	2.0	2.0	2.0	1.0
Carbon Black:							
Short tons	530,614	537,273	566,797	511,813	643,430	622,325	635,781
% of total	93.9	93.1	94.4	93.5	93.5	95.5	95.5
Clay, Kaolin:							
Short tons	231,331	240,982	241,052	247,431	257,223	268,157	301,185
% of total	12.7	13.2	12.8	13.2	11.9	12.0	14.0
Clay, Fire & Stoneware:							
Short tons	.....	9,322	18,475	8,781	2,928	.. ..	.....
% of total	.....	0.1	.2	.1	.2	.....	.....
Lime:							
Short tons	1,126	2,000	1,631	1,555	1,465	2,487	2,799
% of total	(d)	(d)	(d)	(d)	(d)	(d)	(d)
Litharge:							
Short tons	2,641	2,109	2,230	1,768	1,947	2,266	1,898
% of total	1.1	1.5	1.4	1.3	1.3	1.7	1.7
Lithopone:							
Short tons	3,295	1,523	1,723	1,701	2,163	2,000[e]	....
% of total	3.2	2.5	3.3	3.9	5.0	5.0	....
Mica, Ground:							
Short tons	6,551	5,126	5,668	5,021	7,339	7,021	8,579
% of total	9.0	7.0	7.8	6.3	6.9	8.0	9.0
Sulfur:							
Short tons	84,000	84,000	89,600	84,000	89,600	89,600	89,600[e]
% of total	1.4	1.4	1.4	1.3	1.2	1.1	1.1
Talc: [b]							
Short tons	70,970	64,476	61,408	58,139	38,309	30,253	28,532
% of total	11.2	10.9	10.0	9.7	5.4	5.0	6.0
Zinc Oxide:							
Short tons	71,507	72,774	78,439	71,058	86,677	80,459	81,745
% of total	48.4	51.2	52.7	50.7	51.5	51.9	54.0

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude [a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,00[b]	254,620	64.6	30,405	42,532
1943	301,058 [c]	291,082	59 6	15,678	46,201
1944	260,631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	24.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	25.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1957	271,647	267,352	18.2	13,021	29,323
1958	259,809	248,156	18.2	11,362	29,063
1957:					
Sept.	19,892	21,704	17.9	714	25,983
Oct.	26,419	24,925	18.1	1,230	27,171
Nov.	22,083	20,583	17.3	1,15u	27,855
Dec.	20,101	18,263	17.2	843	29,323
1958:					
Feb.	19,017	18,130	18.0	665	28,838
Mar.	20,225	19,300	18.5	1,012	28,984
Apr.	20,735	19,746	19.1	832	29,440
May	19,601	20,104	19.6	1,012	27,862
June	21,230	20,652	19.2	1,024	27,763
July	18,136	18,350	18.2	1,087	26,442
Aug.	22,432	19,347	17.4	900	27,961
Sept.	22,641	21,771	17.7	1,005	26,676
Oct.	26,554	23,563	17.2	1,028	27,340
Nov.	22,450	21,271	17.4	1,051	27,680
Dec.	24,830	23,285	17.5	841	29,063

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production: Rayon Tire Cord Net Woven	Production: Rayon Tire Cord Woven	Production: Cotton and Nylon Cord & Fabric[a]	Production: Chafer Fabrics (all fibers)	Production: Total Tire Cord and Fabric	Stocks[b]: Cotton and Nylon Cord & Fabric	Stocks[b]: Rayon Cord and Fabric
1957:							
Jan.-Mar.	21,853	68,825	31,393	11,028	123,182	11,844	37,153
Apr.-June	16,037	63,195	35,308	10,456	115,418	13,428	13,473
July-Sept.	10,509	54,968	33,477	9,147	100,091	13,305	36,388
Oct.-Dec.	9,216	58,392	32,827	10,176	101,687	14,909	29,632
Total	57,615	245,380	133,005	40,807	440,378	53,486	116,646
1958:							
Jan.-Mar.	8,372	56,522	25,647	7,367	92,924	11,255	33,913
Apr.-June	.....	.....	30,745	6,020	80,533	11,274	26,327
July-Sept.	.....	.....	31,371	6,467	91,984	11,229	26,428
Oct.-Dec.	.....	.. ..	34,858	8,466	107,352	12,251	25,936
Total	8,372	56,522	122,621	28,320	372,793	46,009	112,604

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1952	1953	1954	1955	1956	1957	1958
Jan.	86,863	89,634	89,852	96,397	100,642	109,295	107,281
Feb.	82,043	86,458	86,206	88,464	98,088	96,694	95,516
Mar.	87,065	98,158	101,549	105,684	112,412	113,166	108,914
Apr.	98,563	102,044	103,866	111,116	113,034	115,820	118,477
May	101,137	105,918	104,418	115,707	123,560	124,325	125,137
June	99,305	114,703	113,037	120,710	126,838	121,598	125,444
July	105,307	112,969	112,231	115,653	120,708	130,251	130,903
Aug.	102,954	109,124	110,223	121,816	125,847	128,808	129,925
Sept.	100,095	106,158	104,706	113,379	111,574	113,567	120,389
Oct.	103,689	106,037	105,607	112,558	119,204	119,334	125,097
Nov.	91,326	99,210	102,393	109,212	112,113	107,705	110,587
Dec.	95,817	100,225	104,258	111,034	108,096	112,691	120,305
Total	1,154,254	1,230,629	1,238,346	1,321,730	1,372,116	1,393,254	1,417,975

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1958	745	536,820	1,501	1,698,840	157	224,499
1958:						
Apr.	6	2,787	74	75,302	17	19,187
May	242	131,642	131	151,130	22	35,366
June	16	11,515	89	108,419	21	28,739
July	19	12,359	201	254,075	42	45,692
Aug.	53	36,666	135	149,918	10	16,675
Sept.	97	29,775	129	189,219	13	10,199
Oct.	39	83,128	165	123,167	6	16,300
Nov.	107	90,763	119	150,300	...	.....
Dec.	119	103,432	192	220,972	5	6,786

Source: U. S. Department of Commerce.

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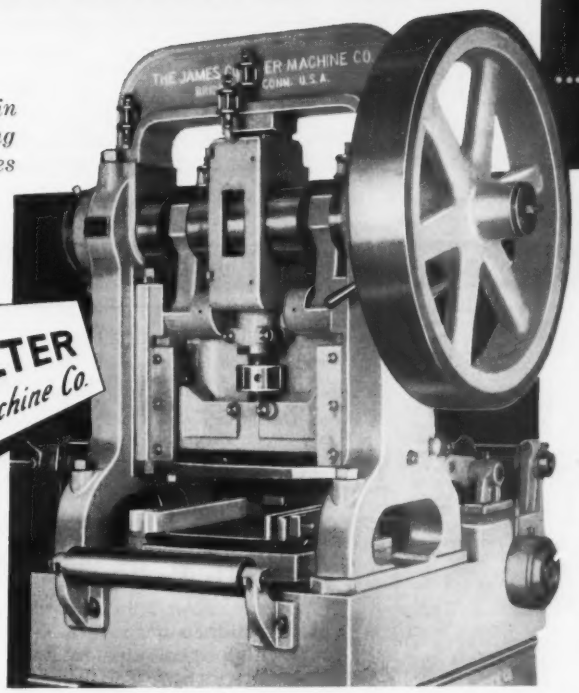

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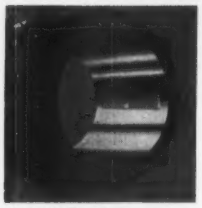

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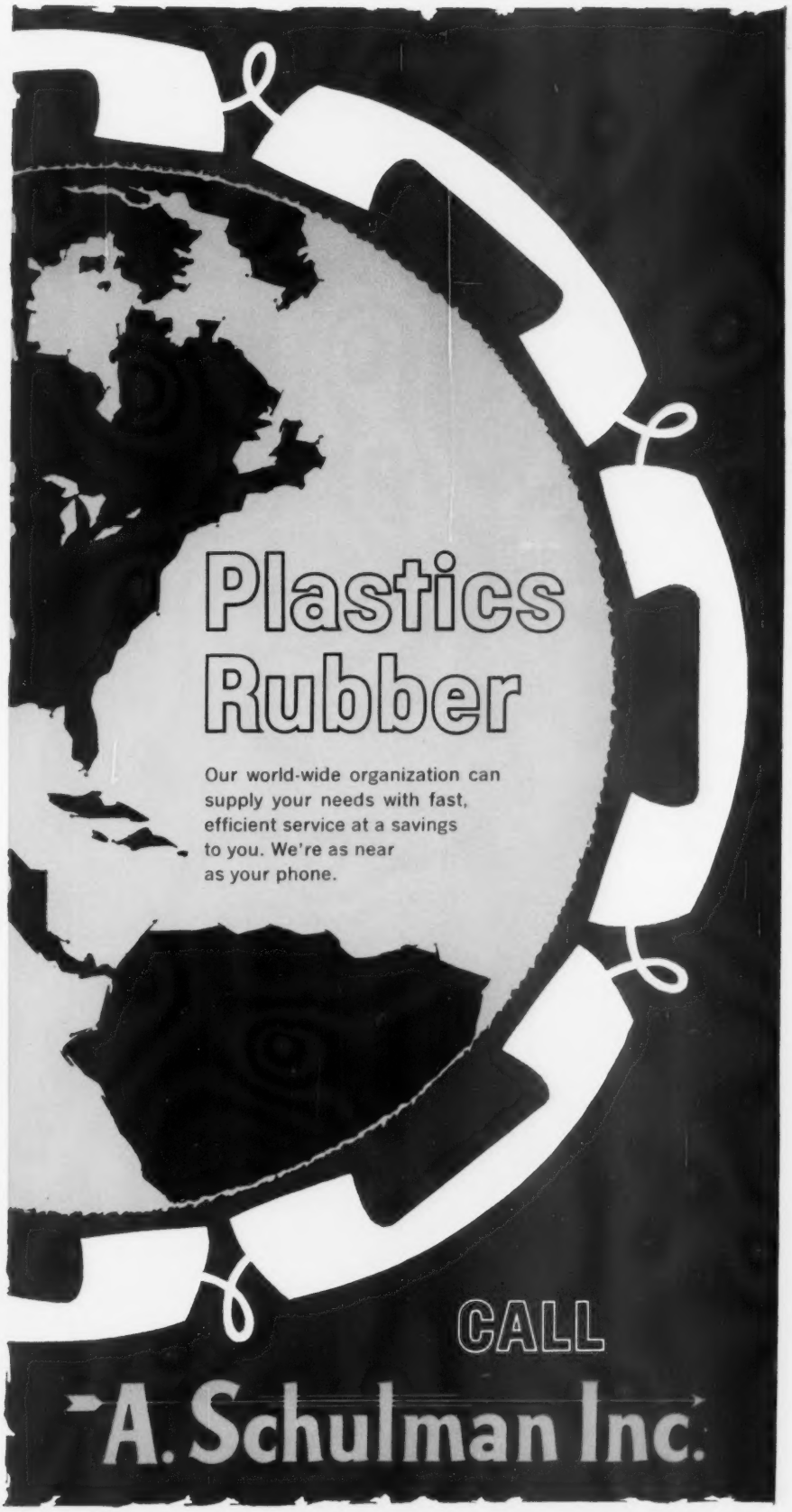
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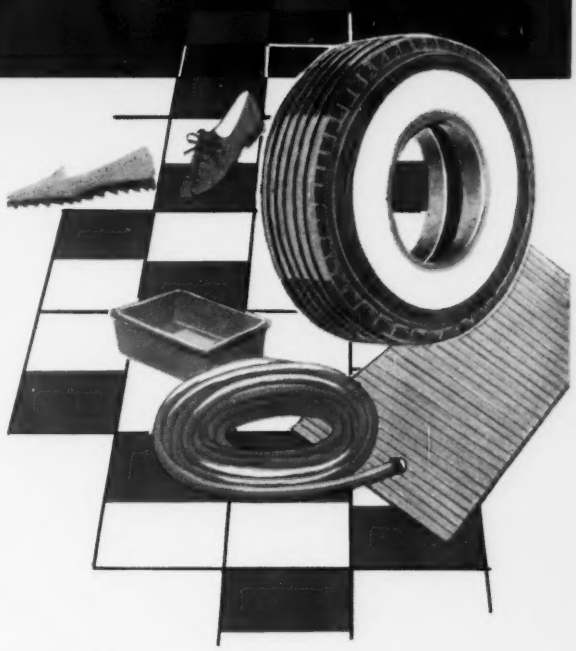

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